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Telephony®

THE JOURNAL OF THE TELEPHONE INDUSTRY
SINCE 1901

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Guaranteed Circulation This Issue
13,522 of Which 12,849 Is Paid

TREASURE IN YELLOW PAGES

Using the yellow pages to find solutions to home repair problems won Shirley B. Miller a dividend harvest in contest sponsored by Reuben H. Donnelley Corp. She's shown at A. C. Allyn & Co., stockbrokers. See page 44.

MANAGEMENT • PLANT • TRAFFIC • COMMERCIAL • LEGAL • ACCOUNTING

How to boost your profits and prestige

The answer is proven *customer preference* for the Stromberg-Carlson No. 121 Cordless Switchboard (above) and the No. 120 cord-type model.

Your commercial subscribers who need attended PBX service will welcome the exclusive modern styling of these switchboards—as well as their operating efficiency. *You* will welcome their ease of installation and low maintenance cost.

Our No. 121 Switchboard comes in warm two-tone walnut veneer with sun-tan key panel. It provides 12 or 16 inside lines, 5 trunks, 5 connecting circuits. A secretary or clerk can do double duty as switchboard operator.

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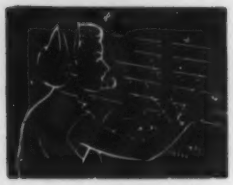

FLASHES AND PLUGS

PARTY LINE BY PROXY. In Austin, Tex., a fellow named Jesse Gartman picked up his telephone and heard strange voices.

He listened for a while and discovered that he was telephoned in on the sound part of the CBS television show, "The Verdict Is Yours."

So he heard the verdict, hung up and tried again to get his number.

This time, he got "The Brighter Day." Jesse didn't mind listening, but he also wanted to talk.

So, again he hung up and made a third try, which got him a first-class connection with "The Secret Storm."

The Austin man then reported his trouble to the telephone company. The people there . . . checked his line and, sure enough, found themselves tuned in to tv.

Since this could not be, the telephone company provided a new line to the Gartman house. Officials of the telephone company blamed heavy rain for the trouble.

Mr. Gartman is happy now that his utilities are not crossed. He allowed that sound-only tv is not to be recommended. Out of sight can drive a man out of mind.—*Television Age.*

•

CURB-SIDE COMFORT. Syndicated Columnist Inez Robb, a New York City resident, admitted recently in one of her columns that the big city isn't always "fustest with the mostest and the newest."

On a trip through the southern states, she discovered to her delight that although New York has drive-up mail boxes, the town of Humboldt, Tenn., has drive-up telephones for curb service calls.

She says, "The motorist merely leans out the window, picks up the telephone with its extension cord, and settles back comfortably for a chat without having to bestir himself whatsoever."

•

SAFETY HAZARD. "'Ow did Bill die?"
"'E fell through some scaffolding."
"Whatever was 'e doin' up there?"
"Bein' 'anged."—*Pacific Oil-Motive Magazine.*

•

ALARM ON REBOUND. The fire department of a southern Illinois town roared over to the local high school in response to an alarm over a special line from the school gym. Instead of crackling flames, firemen found a red-hot basketball game.

It turned out that the alarm switch was on a wall close to one of the baskets. A wild shot missed its mark and triggered the alarm.

The principal, shaking his head at the inaccuracy of his cagers, arranged for a glass door to protect the vulnerable switch.

CHANGE OF ADDRESS

Please notify your local postmaster and the Circulation Department of TELEPHONY of change of address. Change cannot be made without the old as well as the new address. Allow three weeks for change of address to become effective.

Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY
Since 1901

November 28, 1959

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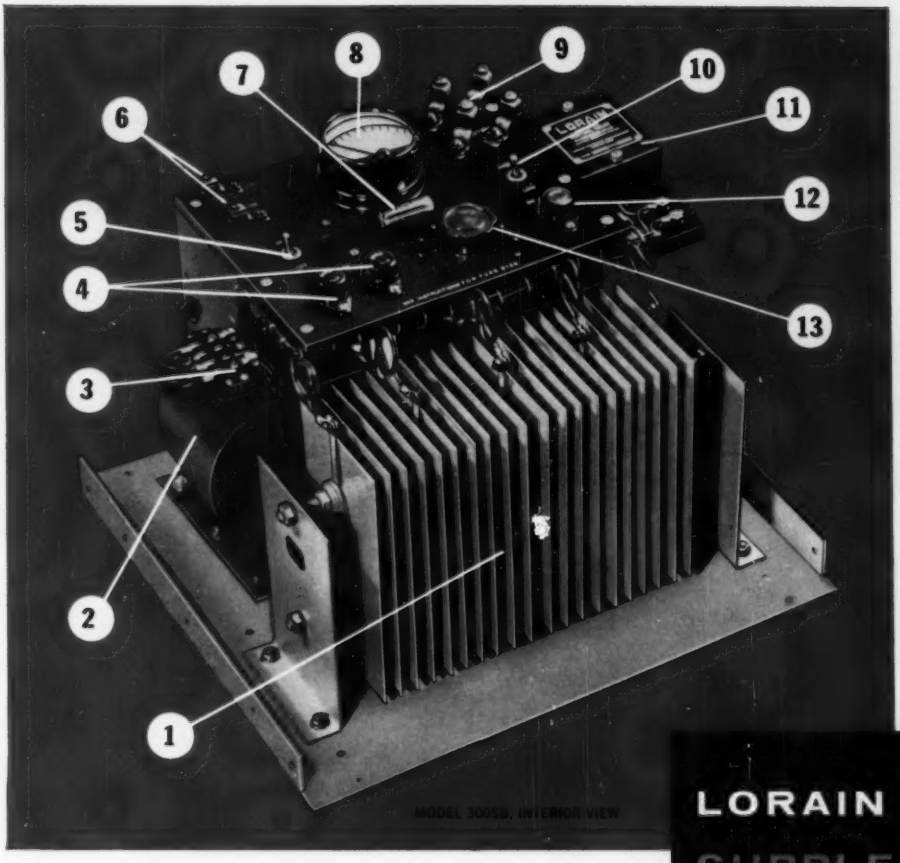

MODEL 300SB, INTERIOR VIEW

1. Selenium rectifier
2. Isolating transformer
3. Taps to adjust for A-C line voltage
4. A-C line fuses
5. On-off switch
6. A-C input terminals
7. Neon lamp to indicate tripping of overload relay
8. Output ammeter
9. D-C connections
10. Output range selector switch
11. Control relay, type FS1R
12. D-C load fuse
13. Tap switch

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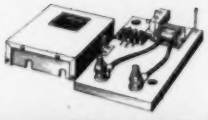

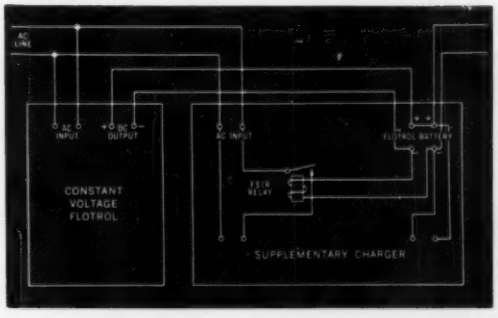

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Kellogg's K-500 series is your best answer to assure subscriber satisfaction and long, reliable service. Ask your local Kellogg representative to explain the new monthly shipment plan for K-500s: it guarantees you a steady supply of these wanted telephones —at lowest unit cost.

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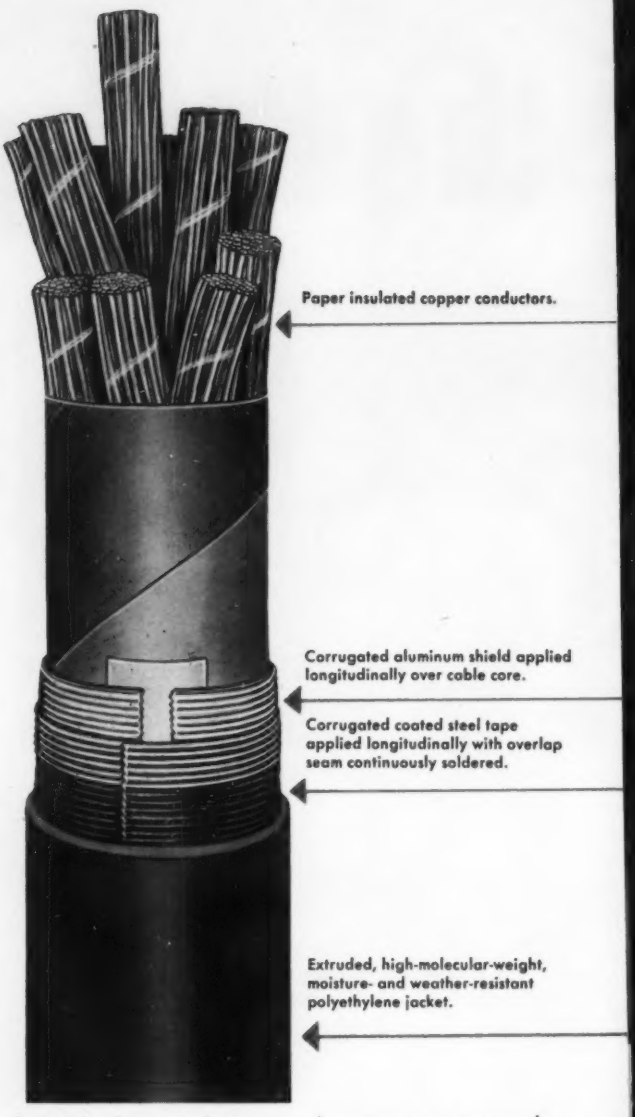
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Extruded, high-molecular-weight, moisture- and weather-resistant polyethylene jacket.

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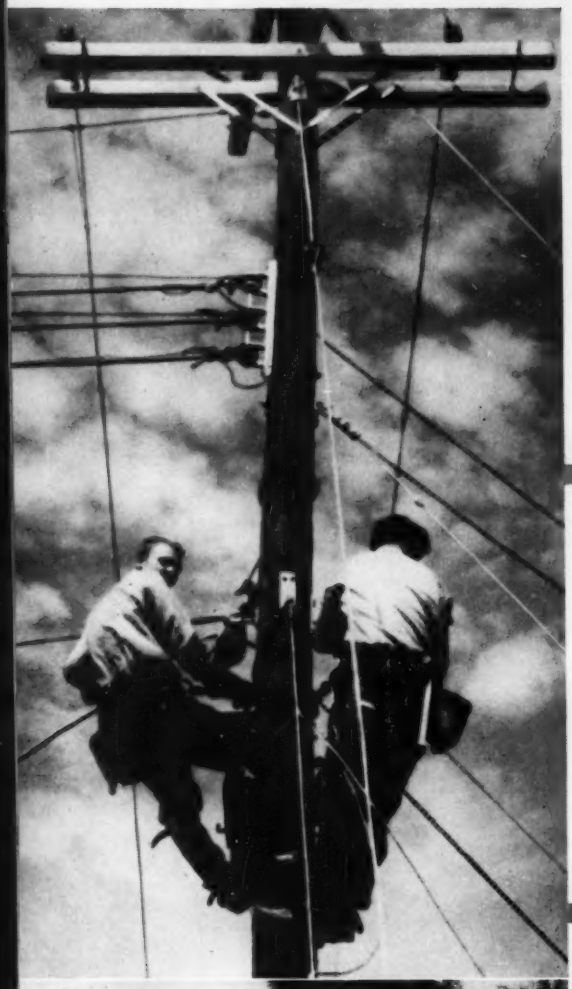

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HIGHER INSULATION RESISTANCE

Each conductor in any length of cable, when measured against all other conductors and the grounded shield, shall have an insulation resistance of 1000 megohm-miles measured with a d-c potential of not less than 100 nor more than 550 volts applied for a period of one minute.

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ALL SIZES	LENGTH OF CABLE	PAIR TO PAIR MAX. CAPAC. UNBALANCE
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	1001 to 2000 ft.	150
	2001 to 3500 ft.	200
	3501 and up	300

MORE GUARANTEED PAIRS

SIZE, AWG	NO. OF PAIRS IN CABLE	MAXIMUM ALLOWABLE NO. OF DEFECTIVE PAIRS
19	All Pair Sizes	0
22	All Pair Sizes	0
24	Up to 303	1
	404, 606	2
	909 through 1818	3
26	Up to 202	1
	303	2
	404, 606	3
	909	4
	1212 through 2121	5

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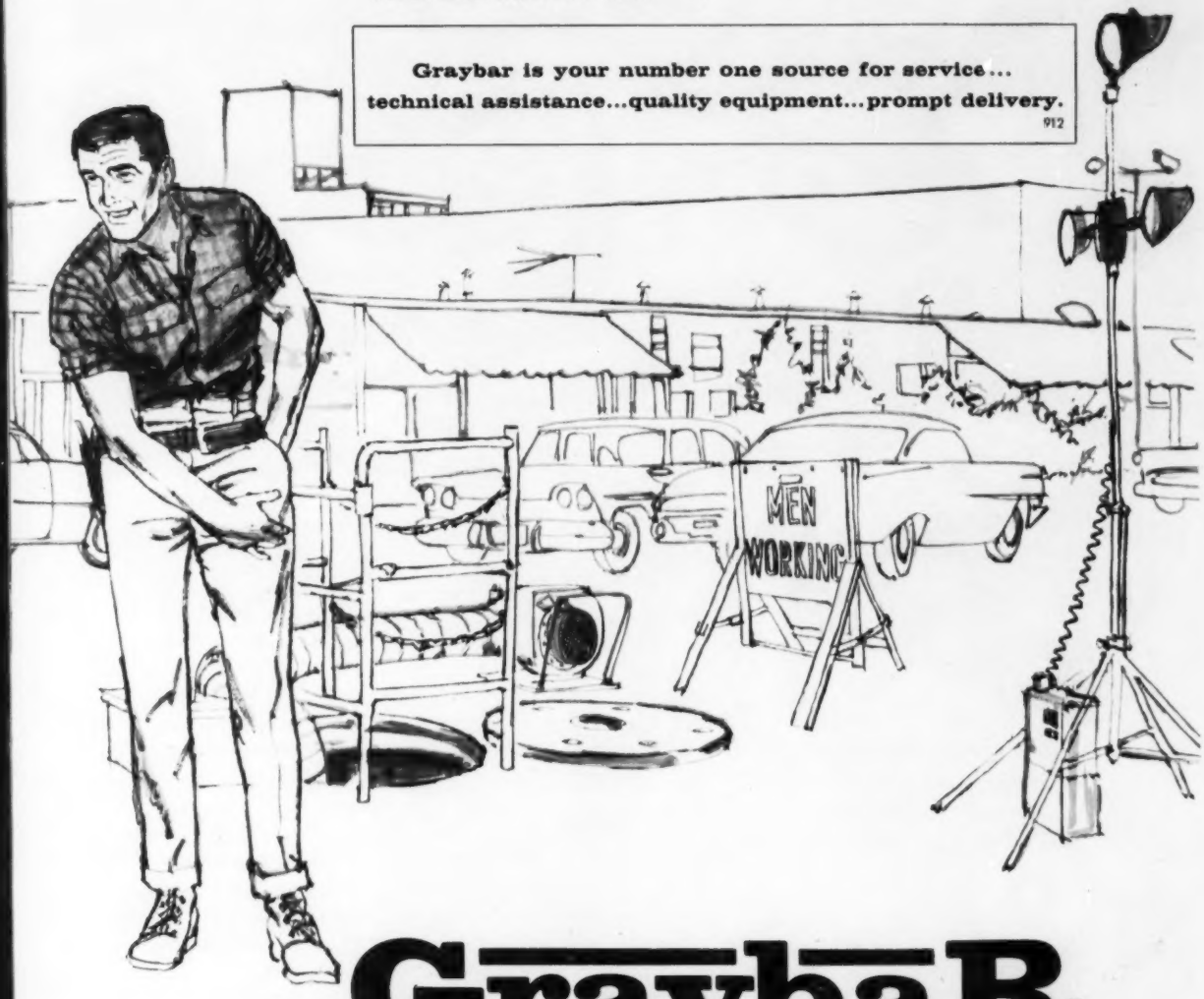
912



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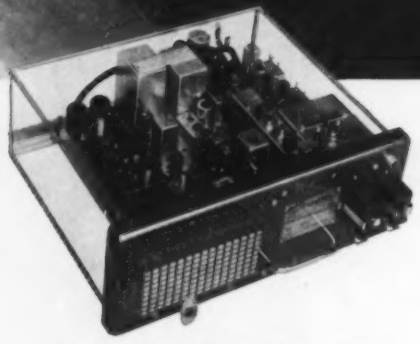

Mobiltel Manual subscriber station equipped with optional transistorized power supply with 12-volt input. Compact 14" case easily fits in trunk compartment.

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NOW "READY TO GROW" IN YOUR TERRITORY

Lenkurt Mobiltel mobile telephone systems are here *now* . . . both manual and automatic . . . completely new in design, *telephone-engineered* from dashboard to switchboard, ready for telephone company use.

Because of its compactness and reliability, Lenkurt Mobiltel is an easy-to-sell service. It will open up new avenues of revenue for you, in *Mobile Subscriber Service* and *"Fixed-Mobile"* service.

Subscriber equipment will operate from a standard car battery or from 110 volts a.c. An optional *transistorized* power supply reduces battery drain. Receivers and transmitters of subscriber and base-station assemblies are easily interchangeable for maintenance.

Lenkurt Mobiltel Manual provides a completely integrated system, from telephone switchboard to subscriber equipment, and is fully compatible with Bell System service. Mobiltel Automatic serves dial exchanges where operators are not available.

Complete Mobiltel "packages" can be furnished in common-carrier frequencies and various power outputs – custom-tailored for large or small communities. Available on an "Engineer, Furnish, and Install" basis, if you require it. For the full story, ask your Automatic Electric representative for Circular 901-P4, or write Mr. T. B. Collins, Director, Carrier & Radio Sales, Automatic Electric Sales Corporation, Northlake, Illinois.

AUTOMATIC ELECTRIC GENERAL TELEPHONE SYSTEM

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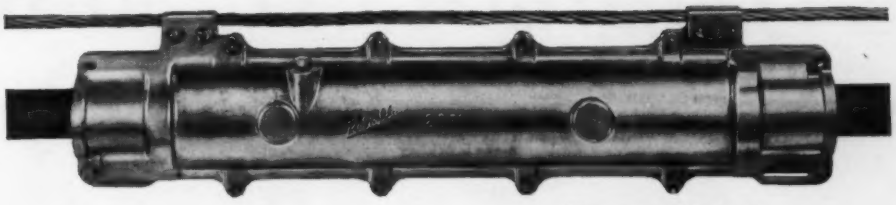

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Single terminal — 6, 11 and 16 pair.
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Send us your Installation Specification No. 104 and additional information on these splice cases and splice case terminals.

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Toll calls billed with a

4 times faster Recordak Microfilmer!

Taking pictures of toll call tickets with a Recordak Microfilmer ends the job of transcribing a description of each toll call from ticket to bill. The tickets themselves *do the work for you!*

Here's how this simple routine works: You just add up toll charges . . . enter *this total* and tax on bill . . . then microfilm bill and toll tickets . . . clip them together and send on to subscriber!

This cuts entries per bill to four at most (subscriber's telephone number, total, tax, and grand total) no matter how many calls were made. This eliminates hours of tedious transcribing . . . lets each clerk handle 4 times as many accounts. Also important, you cut chance for error to strictest minimum . . . keep a film record that is complete, accurate, and easy to check.

Convenient microfilming. The new Recordak Portable Microfilmer is ideal for telephone company use. Compact, low in weight—only 24 lbs. You can use it wherever the work is. Easy to operate—just feed toll tickets and bills and they're microfilmed and returned in sequence—as many as 90 per minute. Also available from Recordak, a complete line of automatic microfilming equipment for larger organizations.

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Street_____

City_____ State_____

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Customer satisfaction is one reason why L. M. Berry and Company has successfully enjoyed the association of leading Telephone Companies throughout the United States for 49 years.

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C. T. & N. TELEPHONE COMPANY, Inc.
GENERAL OFFICES
CASEY, ILLINOIS
O. A. LOGUE, PRESIDENT

February 12, 1959

L. M. Berry and Company
Dayton 2, Ohio

Gentlemen:

Recently one of our subscribers complimented us on the manner in which his advertising was handled, and it reminded me of the fact that for some twenty-two years your organization has capably managed our directory work.

The C. T. & N. Telephone Company is very pleased with the quality of work you have done. Your representatives, sent to work among our subscribers, have solicited advertising with skill and a sensitivity which reflects your careful choice of workers and thorough training. We are convinced that by giving good service to our subscribers through their advertising, we maintain good public relations.

We would also like to express our appreciation for your tireless efforts in helping us make up a directory cover tailored to our company and our community. This extra service, giving us the benefit of your experience and know-how, was much appreciated.

We trust that our association with your organization, and you, personally, will continue to be as pleasant as it has been in the past.

Very truly yours,

Russell Logue

Russell Logue
Vice President

RL/d

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TELEPHONE DIRECTORY ADVERTISING EXCLUSIVELY

IN THE NATION'S CAPITAL

BY FRANCIS X. WELCH, WASHINGTON EDITOR
AND EDITOR, PUBLIC UTILITIES FORTNIGHTLY

FCC joins quiz show investigation . . . will determine if station licensees are operating in "public interest." Senate subcommittee resumes hearings on federal agency reform bills designed to correct regulatory procedural deficiencies. Chairman of Mississippi commission readies opinion on legality of backbilling for undercharges. Volkswagen denationalization may go only part way.

AFTER PREVIOUSLY refusing to become involved in television's rigged-quiz controversy, the Federal Communication Commission, in an about-face, decided to look into the quiz shows beginning Dec. 7.

With Chairman Harris (D., Ark.) and his House Subcommittee on Legislative Oversight showing no signs of letting go of its prior rights on this headline-catching investigation, it would appear that the whole thing will become a sort of three-ring circus. The other ring will be occupied by the Federal Trade Commission which had already announced that it was going after the phony advertising phase of TV under its authority to police unfair competition.

While Chairman Harris will occupy the main ring, the FCC and the FTC will occupy the end rings, respectively. FCC Chairman Doerfer will probably try to work out a sort of "House specialty" for his end of the performance. This would be in the nature of determining whether station licensees have been operating in the "public interest," which is about the only vague and broad authority conferred on the FCC under the licensing provision of the Federal Communications Act. It is doubtless still the position of the FCC that it has no authority to interfere with program content, per se—in view of the anticensorship provision of the law.

But with all the criticism of inactivity on the part of regulatory commissions and the exploding indignation over the TV quiz scandals, the FCC doubtless felt that it at least had to square the practices which have been exposed—as far as FCC licenses are concerned—with the provisions of the act. No one knows (and probably will not know) what the limitations of the vague and general power of the law are until appellate courts have spoken, maybe a year hence. But the FCC's part of the act is at least under way and it will probably give a lengthy performance.

The commission said it will hold about 70 public hearings, beginning in Washington, D. C., Dec. 7, to examine abuses brought to light by congressional investigators, and network practices in general. Chairman Doerfer had announced earlier that the hearings probably would not begin until after the first of the year.

The study will focus on fixed quiz shows and payments to disc jockeys for plugging records, along with "offensive commercials and other broadcast practices contrary to the public interest." The FCC invited the networks, civic groups, and others to present their views at the hearings, and gave them until Nov. 25 to accept and offer a résumé of what they will have to say.

Chairman Doerfer indicated earlier that the study might take more than a year. He told United Press International there was doubt any findings would be ready in time for presentation during the next session of Congress. The study could lead to extensive proposals for new legislation. On the other hand, the FCC said it would not hesitate to bring immediate charge if there was evidence that existing laws have been violated.

In another development, the president of the Mutual Broadcasting System, Robert F. Hurleigh, said a Senate subcommittee has evidence that broadcasting rating systems have been rigged. He said the subcommittee plans to investigate. Hurleigh said, before the Sales Executives Club here in Washington last week, "There may be exposures which, though not of the sensational nature of the recent quiz probes, will have a tremendous effect within the industry." He said there is "a great amount of evidence," that rating agencies have deliberately misrepresented the public's reception of certain programs.

The Senate Gets Into the Act

The FCC had its troubles on still another front in Washington last week when a Senate subcommittee, headed by Senator Carroll (D., Colo.), resumed hearings on federal agency reform bills. FCC Chairman Doerfer was the first

witness when the Subcommittee on Administrative Practices and Procedures took up its second phase of testimony on various bills (S 600 and S 2374) to correct procedural deficiencies in the regulatory fields.

One of these bills (S 600) would establish an Office of Federal Administrative Practice. The other, designed to discourage influence peddling (S 2374), would make it a crime to put pressure on, or otherwise seek to influence, any regulatory commissioner or hearing examiner.

But there are other regulatory and administrative officials to be called on the carpet besides Doerfer. Chairman Jerome K. Kuykendall of the Federal Power Commission, Chairman James R. Durfee of the Civil Aeronautics Board, Chairman Edward N. Gadsby of the Securities & Exchange Commission, Chairman Earl W. Kintner of the FTC, and Chairman Kenneth H. Tuggle of the Interstate Commerce Commission are all slated to testify for the other members of the "big six" federal regulatory commissions. In addition, Secretary of the Interior Fred A. Seaton and Secretary of Agriculture Ezra T. Benson were scheduled to give testimony on the operations of their respective departments.

Senator Carroll was the author of S 2374; but he introduced it at the request of the American Bar Association. There has been criticism of it, however, within Congress. Senate Minority Leader Dirksen (R., Ill.), a member of the subcommittee, and other Senators said last summer that they were not going to stand for being bound and gagged as far as their future off-the-record relationship with federal commissions and administrative depart-

REA Approves Loans Totaling $4,571,000

Six telephone loans were approved by the Rural Electrification Administration during the two weeks, Nov. 2-13, as follows:

The Hartland & St. Albans Telephone Co., Hartland, Me.; $109,000; Nov. 6. This loan is earmarked to improve service for 127 subscribers, and furnish initial service to 50 subscribers. The existing subscribers now receive magneto service from the Cambridge Telephone Co. and the Ripley Telephone Co. The borrower proposes to acquire and rehabilitate these facilities. A new dial central office will be constructed at West Ripley.

This borrower has now received $316,000 in REA loans which will enable it to provide new and improved service to 766 subscribers. The borrower's Hartland exchange is now furnishing dial service to approximately 550 subscribers.

Dr. Arthur L. Moulton is both president and manager of the Hartland & St. Albans Co.

•

The Plain Dealing (La.) Telephone Co.; $76,000; Nov. 9. These funds will enable the borrower to furnish initial service to 68 subscribers, expand its operating territory to include an unserved area in and around Ivan, and to install dial mobile radio telephone equipment.

REA loans to the borrower total $439,000, which will make possible new and improved service for 801 subscribers in Bossier parish. Approximately 660 subscribers are now receiving dial service from the company.

George L. Lee is president and manager of the Plain Dealing company.

•

The South Missouri Telephone Co., Steelville, Mo.; $329,000; Nov. 9. This loan will be used to improve service for 409 subscribers and furnish initial service to 255 subscribers. As a nucleus for the expanded service, the borrower plans to acquire the Birch Tree Telephone Co. and has recently acquired the Leesburg Telephone Co. Present facilities provide magneto service to the existing subscribers.

The South Missouri company's construction schedule includes new dial central offices at Birch Tree and Leesburg.

REA loans to this company now total $1,605,000, and will enable the borrower to provide new and improved service to 3,311 subscribers.

James D. Worley is president and manager of the South Missouri company.

•

The Concord (Tenn.) Telephone Exchange; $234,000; Nov. 9. This loan will provide facilities to serve 288 new subscribers and to complete the authorized system.

The borrower has received REA loans totaling $585,000 to enable it to furnish new and improved service to 1,080 subscribers. Approximately 685 subscribers now receive dial service.

Robert A. Russell is president and Fred L. McFee is manager of the Concord Telephone Exchange.

•

The Calhoun City (Miss.) Telephone Co.; $255,000; Nov. 10. These funds will enable the borrower to furnish initial service to 447 subscribers, and complete its authorized system. Facilities required to serve the additional subscribers include expansion of dial equipment in the Calhoun City and Vardaman exchanges.

REA loans to the Mississippi company total $670,000 which will make possible new and improved service to 1,542 subscribers. The three exchanges of the system furnish dial service to approximately 1,010 subscribers.

Wade H. Creekmore is president and E. R. Creekmore Jr. is manager of the Calhoun City company.

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The Bethel & Mt. Aetna Telephone & Telegraph Co., Myerstown, Pa.; $3,568,000; Nov. 9. These funds will enable the new borrower to improve service for 7,686 existing subscribers, and furnish initial service to 2,914 others. The company presently furnishes dial and magneto service through seven exchanges.

The Bethel & Mt. Aetna company proposes to retain and enlarge, if necessary, its Myerstown, Shellsville, and Womelsdorf dial offices; and construct new dial offices at Bernville, Frystown, Jonestown, Robesconia and Schaefferstown. In addition, new headquarters facilities will be constructed at Myerstown.

A portion of the loan will be used to refinance indebtedness incurred by the borrower in modernizing its present system.

Harry R. Miller is president and J. Hiram Swope is manager of the Bethel & Mt. Aetna company.

ments were concerned. Senator Hart (D., Mich.) is the third member of Carroll's subcommittee and he is also the co-author of S 600, which was introduced early last year by Senator Hennings (D. Mo.).

Senator Carroll is planning a fairly broad agenda in his attempt to build up a record on the need for anti-influence legislation. After the regulatory commission and other officials have been heard, Carroll plans to take testimony from a number of trade and business associations as well as practicing attorneys.

Back Billings for Undercharges

How does a telephone company (or any other public utility for that matter) go about billing customers retroactively—for money the subscribers should have sent in but did not, because of a rate dispute? There is much precedent on the books when the shoe is on the other foot—that is to say, when the utility company has overcharged and must make refunds. But the reverse of the process is rare. And, by its very nature, it is a very difficult operation.

When a utility company overcharges, there is only one party responsible—the utility company. But when utility customers have been *undercharged*, the responsibility may run into the thousands or even millions.

Hence the interest expressed in efforts being made by Southern Bell Telephone & Telegraph Co. to bill in retrospect over 20,000 customers in 11 cities for about $800,000. The cities are all in Mississippi. And the chairman of the Mississippi Public Service Commission is preparing a study report which will soon be released.

Incidentally the chairman of the commission, Norman A. Johnson, said he is not convinced that there is such a thing as "legal back billing of customers for utilities." He could find no record of earlier attempts or accomplishment in this direction.

What led to this mixup in Mississippi, however, was the following succession of events: In 1956, Southern Bell put into effect, under bond, rate increases amounting to $2,750,000 annually after the commission had refused to grant such hikes. The company appealed to the Hinds chancery court, which ruled in favor of the commission. An appeal to the Mississippi supreme court followed. The high court upheld the chancery court's decree. As a result, Southern Bell is preparing to *refund* some 9 million dollars, plus interest at 6 per cent, to telephone customers throughout Mississippi.

But refunding is not all that is involved here. Until the advanced rates were put into effect under bond, some suburban and rural customers paid mileage rates, which were discontinued by the telephone company under the new bonded rate structure. Because the supreme court has ruled the bonded rates illegal, the utility now holds that the reduced mileage rates also were illegal and must be repaid. Notices have been sent to customers that they will be back billed. Chairman Johnson said that while he was inclined to advise against customers paying back bills, he thought some customers would force a test case by seeking an injunction against the back billing.

Chairman Johnson said his remarks were prompted by numerous queries from throughout the state. He cited as an example a letter from a former legislator, Floyd Fountain of Biloxi, who said: "I don't see where the telephone company has a right to demand refunds. We did not ask for any reduction. They did this on their own accord. In other words, according to this view, it is all right to make the telephone company refund an overcharge to a customer; but it is all wrong for a customer to refund an undercharge to the telephone company.

The North Pittsburgh Telephone Co., Gibsonia, Pa., displayed a float featuring a bevy of beauties in the local Richland Township Centennial Parade. Sitting on the pink float telephone throne is "Miss North Pittsburgh," represented by Sally Hackney of the traffic department. In front of her is her court (left to right): Lois Danner, engineering; Sherry Kowalski, IBM; and Carol Neill, accounting. The revolving turret displayed telephones from 1875 up to today's color instruments.

Denationalizing an Industry

How do you go about denationalizing an industry which has once fallen into the orbit of public ownership? It isn't easy and it happens very rarely. Economists usually speak of socialism as being virtually irreversible and irretrievable, as far as private enterprise is concerned. They used to say of local public ownership of utilities—which is often proposed and often turned down —that it could lose a hundred elections, but only had to win once! Like the omelet, a socialized business is hard, if not impossible, to unscramble.

But Western Germany has shown us a thing or two in the denationalization of Volkswagen, the state-owned automobile manufacturing company. The denationalization of Volkswagen is the first example, aside from the *partial* denationalization of the British steel industry, in which a national government has, in recent years, turned a publicly owned business back to private ownership. The *modus operandi* is reminiscent of the plan of Charles Wilson (General Electric—not General Motors) back in 1952, to turn TVA back to private ownership via sale of stock certificates. Wilson proposed that if the electric business of TVA were incorporated and its stock sold to the public, it would become just like any other electric company.

The decision to transform the Volkswagen automobile plant in West Germany into a privately-owned corporation has many interesting implications. The progress of the new company will be watched carefully by its competitors here and abroad. Volkswagen originally was created by Adolf Hitler for the manufacture of a "people's car" and was operated by the Nazi labor front. The factory in Lower Saxony was destroyed in a bombing raid, but was rebuilt after the war. It has been operated, if not owned, by a labor-management combination and has been enormously successful. It has never been able to keep up with its orders and is far behind today.

Ownership has been a vexing prob-

(Continued on page 55)

Defense Communications for the Future

By C. J. EARL*

TODAY, it is no longer an assurance of our country's survival to plan defense communication systems to meet present military requirements. The pace is such that merely keeping abreast of current weapon research and development is not nearly enough. In other words, we must anticipate tomorrow's defense communication needs today. Specifically, it is imperative that we direct our attention *now* to the communication requirements of the Air Defense Command for the years to come.

However, before we look to the future, let us review briefly the history of Air Defense Command communications.

Early in 1950, the U. S. Air Force was assigned the task of establishing an aircraft control and early warning radar network for the continental United States. This program was known as the "P" site or Permanent Program, and the ADC was named the operating agency. "On site" communications were engineered and provided by the Air Materiel Command. Long lines and telephone trunk requirements were provided by existing public telephone companies.

Next, we had the "M" site, the "SM" site, and the "TM" site programs—all very similar in purpose, and all employing much the same kind of communication facilities. These consisted largely of circuits suitable for administrative and tactical operations.

Then, the high-speed jet aircraft came into its own, and it was quite apparent that an even faster means of compiling, utilizing and disseminating tactical information was required if the early warning radar system was to continue to be effective.

SAGE Is Answer

The answer to this was SAGE (Semi-Automatic Ground Environment). This vast electronic air warning system is served by an intricate network of high-speed communications—both radio and wire, civilian and military.

With SAGE in operation, information picked up from early warning radar sites is transmitted automatically into computers. These computers quickly digest the intelligence and then issue orders for appropriate defense action. This may be the scrambling of ADC fighters, the launching of Bomarc or Nike missiles, or both.

The important links between radar stations and the direction or combat centers are supplied by telephone company lines. Guidance for the "AD" sector combat units as well as the missile direction centers is provided by electronic equipment located in ground-air transmitter-receiver installations. Although this control is customarily maintained by a single air defense sector, provision is made whereby control of a weapon may be passed from one sector to another.

Wire Communications Increase

As a gauge by which we may measure the extent of the wire communication facilities provided under the "ACW" concept, let me cite some significant figures: The wire communications used by the ADC in 1955 totaled approximately 450,000 miles—enough to encircle the globe about 18 times. By 1956, this total had increased by one-third to approximately 600,000 miles, or 24 times around the globe. Roughly 8,300 miles of automatic teletype channels were provided in a nationwide net to move tactical information from all parts of the country to "ADC" combat centers. And, under the existing SAGE concept, the wire communication requirements are even greater.

It is understandable that a communication system of this size requires careful planning and constant vigilance to prevent its becoming an unwieldy mass incapable of performing its vital function. Take the DEW line, for example, which as you know, is a series of integrated early warning stations stretching for 3,000 miles along the Arctic Circle. Each of these is in constant communication with its neighbors as well as with other defense lines and forward areas to the south. Not only is the electronic equipment exceedingly complex, but requirements placed on manned machine operation are severe, and there are the additional problems of vast distances and extremes in weather to be surmounted.

Maintenance of DEW Line

Operation and maintenance of the DEW line is the responsibility of an ITT company, Federal Electric Corp., which has among its duties the selection and training of civilian manpower for the line. All applicants are thoroughly screened to determine their technical skills and training and, equally important, their ability to adapt to the rigorous and comparatively lonely life in the far north. Because of the remoteness of the area, it is essential that all personnel become a "jack-of-all-trades" and "master of one."

*Mr. Earl is Government Relations Engineer of Kellogg Switchboard & Supply Co. He gave this address at the recent annual USAF World-Wide Weapons Meeting at Tyndall Air Force Base, Panama City, Fla.

It takes two men to support a third man operationally engaged on the DEW line. In addition, power must be generated at the sites; water must be produced locally; all food must be brought in. Road building and airstrip clearance, maintenance, and support are continuing functions if supplies are to be moved at all.

The DEW line has been described as "a feat of engineering and logistics second to none." The success of its operation, as well as that of similar undertakings, is a tribute to the team work of industry and of the Air Defense Command.

The advent of the guided missile has demanded an even greater refinement of our defense system than did the coming of the high speed jets. Where we had been concerned with aircraft flying at speeds of from 300 to 1,500 miles per hour, we are now faced with the problem of missiles moving at speeds up to 25,000 miles per hour, and where we once computed in hours the time required for the enemy to launch and to strike with long-range weapons, we are now dealing in minutes. Even the ballistic missile early warning system gives less than 15 minutes warning.

Guided Missile Defense

Clearly, the guided missile has compelled a complete re-evaluation of our early warning and retaliatory set up.

We in the communications industry are honored to have been entrusted with providing the most modern, effective communications system that research can produce. We are well aware of our great responsibility to the defense forces and to the nation as a whole. Accordingly, we have continued an unrelenting program of research and development—and with apparent good results.

Among the more critical problems attendant to communications under the missile concept is that of providing a more reliable means of transmission of vital communications. No longer can we tolerate outages of vital communications even for seconds.

Industry has recently come up with solutions in this regard. One device is called the Commswitch, a communications failure detecting switching equipment which listens to telephone conversations, decides whether trouble along the line is making service unsatisfactory and, if so, instantaneously switches the call to an alternate line.

Two Telephone Lines Used

Commswitch operates by sending an analog voice sample with the voice signal along a telephone line and comparing the two signals in a second switch at the other end of the line being monitored. Differences in voltages between the compared signals indicate the existence and degree of trouble. Commswitch is presently used with two high quality telephone lines, a primary and an alternate, and monitors two-way voice communications only. However, the device may be constructed to handle more than two lines and is applicable, with slight modification, to other types of signals sent over other transmission lines.

Another method of insuring that vital communications get through is called DIGICOM (Digital Communication System), an all-digital communication and switching system that automatically bypasses battle damaged lines and reroutes messages over the fastest available path. This switching facility will handle information from computers, radar, analog signals, teleprinters, tape-readers, voice and telemetering systems.

DIGICOM makes telephone messages virtually immune to interference by transmitting speech signals in the form of electrical pulses which are reconverted into audible messages at their destination.

When placed at points on the connecting main circuits or trunk lines, DIGICOM acts as an electronic switchboard, automatically seeking out the fastest message path from originating point to destination. Should one or several trunks become inoperative, DIGICOM will simply by-pass the damaged section and re-route the message, using another trunk in the system. Possible message paths are proportionately increased as more main trunks are fed into the over-all system.

Connections Reduced

By use of novel methods enabling many messages to "share" the same line, the switching equipment has reduced the number of crosspoints or connections necessary to carry on 48 simultaneous conversations through each DIGICOM unit from nearly 10,000 to less than 500. This "time-sharing" concept has also reduced the number of wire-pairs necessary for each group of 24 telephones from 48 to two.

DIGICOM is a digital, as opposed to an analog (standard telephone) system; the audio signal is automatically coded and transmitted as a pattern of pulses. The presence or absence of each pulse constitutes the information carrier.

In standard telephone systems, a continuously varying voltage carries the message as an analogy of the audio signal. A commonplace comparison can be made with standard automobile equipment. The speedometer, an analog computer, measures speed, a continuously varying quantity. The mileage indicator, on the other hand, is a digital computer, numerically recording distance traveled.

Digital methods result in the complete elimination of crosstalk (interference between conversations), and produce signals that do not deteriorate between sending and receiving stations, regardless of intervening distance.

System Self-Correcting

The system is also self-correcting. A decoding unit in the sender's handset automatically corrects the code pattern where necessary, so that the party on the other end receives exactly what is spoken.

A more efficient means of transmitting vital information accompanied by the reliability required is a must.

At the present time, existing data circuits are tailor-made. In order to provide the reliability and the circuit quality required for data, an exact duplicate circuit must be provided. With little advance in the state of the art, and with higher quality line facilities or translation equipment, it will be possible to achieve equal flexibility through the common usage of a smaller group of alternates which will provide a complete back-up capability to a larger group of working circuits. The Air Defense Command and industry are rapidly proceeding toward this goal.

The ability to instanteneously communicate with all parts of the world with absolutely no delay is of paramount importance.

Satellite Communications

Global communication via satellites is a distinct possibility within two or three years. One proposal that shows promise is called "Earth Net Dialing" system for telephone and TV transmission.

The successful orbiting of the 8,500-

(Continued on page 52)

THE Plant Man's Notebook

BY RAY BLAIN, TECHNICAL EDITORIAL DIRECTOR

THE FOLLOWING letter received from Michael Schwart, of Chicago, refers to a recent item on this page describing an old-time unattended dial exchange:

"Back in 1907, the Automatic Electric Co. converted Richmond, Ind., to dial operation through one main office and two non-attended sub-exchanges.

"We, too, had a fire! At 2 a.m. one morning, I received a call that every one of the danger signals had suddenly come in from one of the sub-exchanges.

"I vividly recall the wild 2-mile dash I made to see what was wrong, because the successful operation of that project was my responsibility. I did arrive just in time to prevent the fire department from turning their water hoses on the smoking line switch unit. We had all subscribers back in service though in about 10 days.

"Soon thereafter we placed two Keith line switch units of a more radical design in operation in Columbus, O. One of these units was mounted on a pole in a manner similar to a distribution box. The other was placed in a concrete tank, not too well sealed against the entrance of moisture, in a cable manhole.

"Then, also, about that time we had two sub-exchange installations for semi-automatic operation in conjunction with manual switchboards. One of these was located in Buffalo, N. Y., before that city was made fully automatic and the other in Memphis, Tenn. It was here that I bumped up against—and controlled—a tough humidity reduction problem.

"From these old jobs we can trace the origin of one of the triumphs of present-day research, the line concentrator system."

•

The writer spent a most enjoyable and instructive afternoon in Washington, D. C., recently with Mr. D. P. Bradley, of the Postmaster General's Department of the Commonwealth of Australia.

Mr. Bradley is engineer-in-charge of outside plant design and we found an exchange of ideas helpful to both of us. He had stopped off in Washington on his way back from Cologne, Germany, where he spent several weeks with the cable firm of Felten & Guilleaume A/G. This firm has a large order for coaxial cable for Australia.

•

Out in San Diego, Cal., the widow of an Air Force master sergeant has filed a superior court damage suit for $120,000 as the result of his death following his collapse in a telephone booth at Lindbergh Field, in that city.

It is claimed that persons outside the booth were unable to open the door and remove the ill sergeant on Oct. 4, 1958. A porter pried off the booth door with a crowbar, after the door could be opened only 2 or 3 inches. After arriving by plane, the 41-year-old sergeant was making a telephone call from the booth to the home of his sister.

The suit for wrongful death charged negligent manufacture and maintenance against the defendants, Western Electric Co., Inc., and the Pacific Telephone & Telegraph Company.

It is also said that an operator refused to trace the call.

•

We have a letter from D. E. McGregor, of the Nebraska Central Telephone Co., Gibbon, Neb., in which he informs us that they are planning on the use of all-numeral numbers and no letters when they convert the last two of their six exchanges to dial in the next few months. Furthermore, they plan to change the other four exchanges to all-numeral numbers on the next directory change.

We are certainly pleased to note that the Independent companies are among the first to take advantage of this desirable number system.

•

If you carry a portable radio with you on an American Airlines flight you are requested not to use it while the aircraft is airborne. The reason back of this is that many portables have circuits which radiate signals. These have the effect of miniature broadcasting stations. In some cases, these signals are strong enough to interfere with the aircraft's electronic system and cause erroneous readings of the navigation instruments.

The Radio Technical Commission for Aeronautics is presently investigating this problem to determine which types of portable radios are capable of causing serious interference and which can be used safely in aircraft. Until the results of this investigation are available, it is considered a wise precaution to prohibit the use of portable radios in aircraft during flight.

•

Returning from the USITA convention in a Lockheed Electra turboprop airplane, we were only one hour and 50 minutes in flying from Chicago to Washington, D. C.

Then, due to a low ceiling and congestion at Washington National Airport we were were stacked up for over an hour before obtaining landing clearance.

There is no doubt that improved communications and expanded airport facilities will in the not-too-distant future permit airlines to maintain schedules under practically all weather conditions.

•

Taxes are defined as the way the government has for artifically inducing the rainy day everybody has been saving for.

Wheatstone Bridge Measurements

By JOHN A. BRACKEN

Part 3

SERVICE requirements necessitate that a telephone system function without interruption. Unfortunately, however, trouble does occur, and whether in an open wire line or a cable, it will decrease the operating efficiency of the system.

Trouble, in general, represents a condition which may be caused by:

(1) A broken wire.

(2) The line coming into contact with another line.

(3) The "Tip" and "Ring" conductors coming into contact with each other.

(4) The line coming into direct contact with the earth, or some conductor connected to the earth.

The first trouble is called an open; the second, a cross; the third, a short; and the fourth, a ground, meaning the line is in contact with the earth. Two principal types of grounds commonly encountered are: (1) Low resistance, usually the result of a complete breakdown of the line insulation, and (2) high resistance, the result of a partial breakdown of the insulation, or a poor contact with a grounded object, so that the path to the earth is of high resistance.

When a telephone line becomes grounded, the firmness of the contact between the line and ground usually is of a chance nature; its ohmic resistance may be high or low. In any event, the resistance will be of an unknown value. If it is unusually high (several hundred ohms), owing to an imperfect contact between the line conductor and ground, it might represent the resistance of several miles, or at least many feet of the conductor itself. In this case, a simple resistance measurement to ground might indicate a distance far from the actual point of contact with the ground.

In order that the ground resistance may be rendered negligible, and the point of contact between the telephone line and ground determined, a Wheatstone Bridge measurement called a "Loop" and "Varley" test may be used.

The test consists first, in making a loop resistance measurement as follows:

(1) The grounded line conductor, called the "bad wire" (BW) is connected to the Wheatstone Bridge "X2" binding post, and its mate, or another conductor of the same length, size and conductivity, called the "good wire" (GW), running parallel to the "bad wire," is connected to the "X1" binding post, and the two conductors "looped," that is, joined together at their distant end, as shown at point "L" in *Fig. 1.* The pair then becomes a "metallic" circuit independent of the fault "F."

(Continued on page 26)

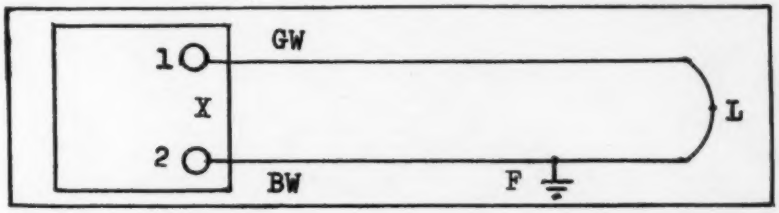


Fig. 1

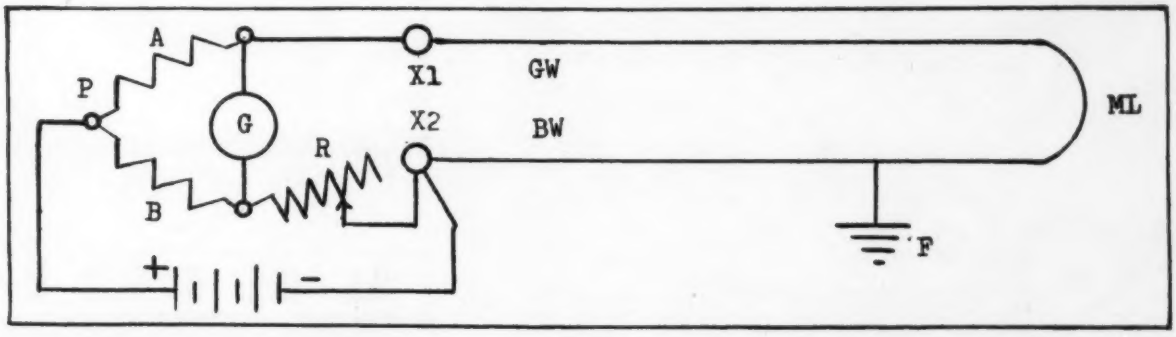
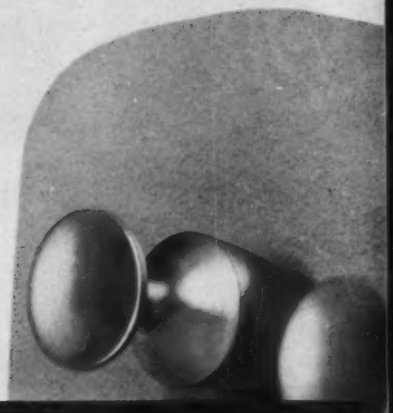


Fig. 2

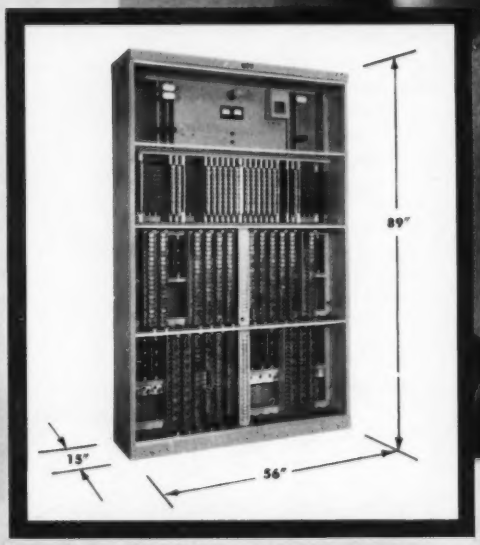
Show How to Extend Calls

with LEICH's Exclusive Keyset Turret



When you show a PABX prospect how to operate Leich's keyset turret, you've shown him how to keep his business humming. Incoming calls from his customers are handled faster than ever before. By simply depressing two or three keyset buttons in sequence, the turret attendant extends incoming calls quickly and easily.

In addition—inside, outgoing, and even consultation calls—are made without help from the turret attendant. Inside parties simply dial the number. Standard Leich dial telephones without special buttons or equipment are used.



All-Relay Leich Dial Switching Equipment Furnished with Leich 88A PABX.

Leich's keyset turret almost sells itself when you show it to subscribers. Why not order one today to use as a demonstration model.

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Modern Keyset turrets are furnished with Leich's 88A, 40A and 100T PABX Systems.

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SOUTHEAST: 5126 SOUTH LOIS ST., TAMPA 11, FLORIDA

manufacturers of telephones, switchboards and related apparatus since 1907

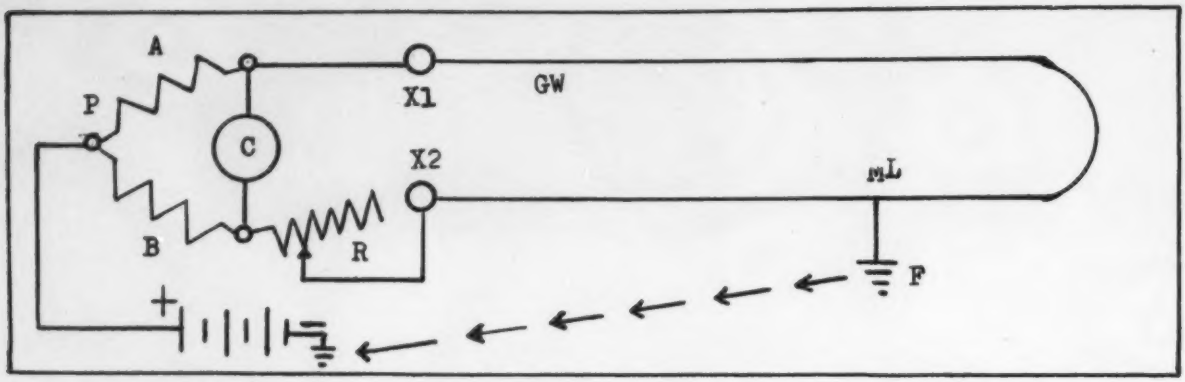


Fig. 3

(2) The Wheatstone Bridge ratio dial is set at $\frac{1}{1}$ (see *Fig. 1* and *Chart 1*, Part 2, TELEPHONY, Nov. 21).

(3) The bridge cam lever switch is operated to its "RES" position.

(4) The bridge rheostat thousands, hundreds, tens, and unit dials are rotated in conjunction with alternately depressing and releasing each galvanometer shunt key until the galvanometer needle rests at zero. The amount of resistance inserted by means of the rheostat dials, in order to bring the galvanometer needle to rest at zero, represents the ohmic resistance of the loop, say, in this case, 240 ohms. The next operation is the Varley test, but before it is made, the bridge "GR" binding post must be connected to a local ground.

(5) The cam lever switch is then operated to its "VAR" (normal) position, and the operation of the rheostat dials and galvanometer shunt keys is repeated until the galvanometer needle again rests at zero. The resistance inserted in the rheostat this time represents the "Varley" reading, of perhaps 40 ohms.

Figs. 2 and *3*, are schematic diagrams of the bridge circuit arrangement for making these measurements. In *Fig. 2*, the connections are such that current from the bridge battery positive pole flows to point "P", where the bridge ratio arms "A" and "B" are joined together, and then divides. A portion flows through paths "B" and "R" to "X 2," then to the battery negative pole, and the balance flows through path "A" to "X 1," then outward around the loop back to "X 2," and from there to the battery negative pole.

It readily will be observed that under the condition shown in *Fig. 2*, the distance from the bridge "X 1" and "X 2" binding posts to where the line conductors are looped together both in resistance and length are identical. Therefore, point "M L" indicates the middle of the loop, electrically speaking.

Fig. 3 illustrates the basis of the "Varley" measurement. Here, the bridge circuit being so arranged that the negative pole of the bridge battery being grounded, current will flow from the positive pole to point "P," then through path "A" to "X 1" and path "B" and "R" to "X 2," then outward over both the "good" and "bad" wires, returning through the earth from the fault "F" to the battery negative pole, as shown by the arrows.

A study of the "Varley" measurement arrangement shown in *Fig. 3*, reveals that the conditions for balancing the bridge are now different from those shown in *Fig. 2*.

Instead of the resistance inserted in the rheostat "R" having to equal the total resistance of the "good" and "bad" wires looped together, the "bad wire" is used in series with the rheostat "R" to ground, and the rheostat then adjusted to equal the difference between the resistance of the "good" and "bad" wires to the fault "F."

In the case of *Fig. 3*, while the total resistance of the two sides of the loop remains the same, one side has been shortened (electrically) 20 ohms and the other lengthened by the same amount. Thus, the "good wire" contains 120 ohms plus 20 ohms, or 140 ohms to the fault "F," while the "bad wire" contains 120 ohms minus 20 ohms, indicating a difference of 40 ohms between the original and new values.

In order to ascertain just where the fault "F" in *Fig. 3* really is, it is necessary to make point "F" the middle of the loop, consequently, by adding enough resistance in series with "X 2" ("bad wire") side of the loop by means of the bridge rheostat "R" to make the total resistance therein equal to that of the "X 1" ("good wire") side, point "F" will be at the middle of the loop, electrically speaking. In this case it is equal to the 40 ohms Varley reading.

The next step is to subtract this 40 ohms from the 240-ohm loop measurement and divide the remainder by 2, which gives 100 ohms as the actual resistance of the "bad wire" from "X 2" to the fault "F."

From this arithmetical operation is obtained the Varley formula: $D=(L-V)\div 2$, where "D" equals the distance in ohms from the bridge to the fault "F," "L" the ohmic resistance of the two conductors measured as a metallic loop, and "V" the resistance inserted in the bridge rheostat "R" with the battery grounded. The result of these Loop and Varley measurements can be verified as follows:

(1) Subtract the Varley reading "V" from the total loop resistance "L" and divide by 2.

(2) Add the Varley reading to the total loop resistance "L" and again divide by 2.

(3) The sum of the values thus obtained, should equal the resistance of the loop "L." For example, in the preceding measurements:

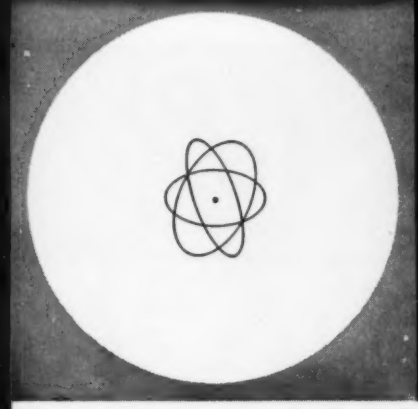
$D=(L-V)\div 2$ or, $240-40=200\div 2=100$ ohms, the resistance of the "bad wire" to the fault.

$D1=(L+V)\div 2$ or, $240+40=280\div 2=140$ ohms, the resistance of the good wire to the fault.

$D+D1$ or, $100+140=240$ ohms, the total resistance of the loop.

In making "Varley" measurements, if it is observed that the galvanometer needle indicates a lower resistance is required in the bridge rheostat to effect a balance, and all four rheostat dials are set at "0," it is an indication that the "bad wire" which has the least resistance to the fault, is connected to the bridge "X 1" binding post instead of "X 2," and the connections must be transposed in order to balance the bridge.

(To Be Continued)



EDITOR'S NOTE: Mr. McKay was unable to prepare his regular "Electronics Section" for this issue because of a brief visit to the hospital. However, we are fortunate to be able to publish an address which he prepared for presentation at the Seminar on Data Transmission, held in Montreal, Canada, on Nov. 16 and 17 by Automatic Electric Co. Mr. McKay's paper entitled "Transmission of Data Pulses on Telephone Lines," which follows, should be of interest and help to all telephone companies.

TRANSMISSION OF DATA PULSES ON TELEPHONE LINES

By Harold B. McKay

THE TRANSMISSION of data impulses over a wire circuit at first glance seems disarmingly simple. After all, the basic data quantity, the binary digit or "bit" is nothing more than an on and off pulse—a dot and a space—simple telegraph.

Yet the earlier telegraphers, as their lines grew longer and the speed of traffic increased, found out that it was not so simple. One of the earliest words to enter our modern electronic jargon was the "baud," a measure of the traffic handling capabilities of a telegraph circuit.

With this background, it is perhaps natural that great advances in data handling circuitry should be made by a company like Western Union, which not only has leased thousands of miles of circuits for this purpose, but has also pioneered in the design of measuring equipment for such circuits.

Telephone companies perhaps got their introduction to data transmission with the first telephotograph circuits of a few decades ago. The techniques for conditioning a voice frequency line to handle picture information are still valid in preparing data transmission circuits today.

The importance of data transmission to any wire using company today must not be underestimated. The announcement that the U. S. Bureau of Internal Revenue plans the use of business machines to check tax returns, and the announcement that the U. S. Post Office is dabbling with the transmission of facsimile mail, means these things are here to stay. This is true if for no other reason than the fact that government usually lags behind business in modernization and improvements.

The trend is such that even the smaller businesses can benefit by the use of electronic business machinery, but the great cost of these machines prevents their use in small establishments. This is where the wire using companies come in. It is perfectly feasible for a group of small businesses to share the use of a single machine, by connecting it over wires from a central location to their respective offices. Such an arrangement is now being used by a group of insurance companies in the United States.

The big machines are usually leased rather than sold outright anyway, and there is no reason to suppose that someone will not ultimately install a large machine for "public" use by any one who can dial into it over a telephone line.

The use of modern electronic equipment by all sorts of businesses must not be minimized. For example, the railroads of today, which are sometimes thought of as slow to progress, are using the very latest of closed circuit television equipment to read box car numbers on moving trains. Data circuits are being used to transmit freight information from one station to the other, and modern radio and microwave links are displacing the "brass pounder" in the station.

An interesting example of this is the Pacific Great Eastern Railway in British Columbia. One can ride hundreds of miles on this line through some of the most beautiful country in the world, before he becomes suddenly aware that his view is unmarred by telegraph wires. The viewer suddenly becomes aware that the wires are missing. But this is because this railroad's entire communication system is based on the use of radio. Instead of poles along the right-of-way, one sees an occasional Yagi antenna at a way station, or a walkie-talkie held by a passing trainman.

The significance of all this is that business today is electronically minded, and competition will ulti-

mately force even the most backward thinkers to get modern equipment.

It was perhaps natural that a company like Sylvania Electric would be one of the first to put in a continent-wide business machine system. This company installed an expensive Univac system in Camillus, N. Y. By Western Union wires this machine is connected to dozens of Sylvania establishments throughout the United States. These include laboratories, warehouses, sales offices and factories.

By means of this remarkable machine, Sylvania can keep track of its inventory in all warehouses constantly, can process customer orders in the various sales offices and keep the payroll for the entire system. In its "spare time" the giant machine is available over the wire lines to the scientists in Sylvania's laboratories for their more complicated calculations.

Perhaps a measure of the efficiency of this system is best expressed in the declaration by one of the employes at Sylvania's Mountain View, Cal. plant, who declared that he now gets his paycheck faster from the machine in New York, than he did when it was prepared by a local payroll department.

A similar system is in use by the U. S. Army Signal Corps, but it is even larger in scope because it can be extended by radio links to points around the world.

So far, large companies like the Bell System and Western Union have been able to find or prepare circuits to handle the data transmission demands. But no one is an island in this business. Anyone with a wire plant may be called upon to use it for data transmission, if not for their own use, perhaps for the use of those who would lease circuits from them.

An example of how circuits are patched together today is seen in the case of a California oil company, which, in order to connect communication circuits to its wells, leases circuits from telegraph and telephone companies, as well as from two different railroads and another oil company. Some of these circuits handle combined traffic—telephone, telegraph, and control circuits which turn pumps on and off from great distances.

It can, therefore, be seen that as businesses of all sorts see the economy and advantages of the use of electronic equipment, the load on the communication companies is bound to increase.

Incidentally, it might be well to be aware that business firms have no monopoly on this kind of thinking. Earlier this year on a trip to Vancouver, British Columbia, I was amazed to find this operation taking place:

A woman, ill in a hospital in Vancouver, had her family gather around for a visit, all, that is except a daughter in San Francisco, who was unable to make the trip. So, the family in Vancouver brought along a tape recorder, and made a recording of the visit of the family with the mother, which I am told lasted 20 minutes or so.

By previous arrangement this enterprising family then called the daughter in San Francisco, who had a similar tape recorder. Both recorders were stepped up to travel at much greater than their normal speed. Once the telephone connection was established, the recorder in Vancouver was played at high speed into the telephone, and the results recorded on the machine in San Francisco. When this latter tape was played back at normal speed, the daughter in San Francisco was able to hear 20 minutes or so of conversation for the price of a three minute telephone call. I could not verify the time quoted, nor do I know how good the transmission was, but one cannot help but note the similarity of this method to one now being used for data transmission by the telephone companies.

The people involved in this experiment were trained in amateur radio, but these people are pioneers in many fields, and while this stunt may not be indicative of a trend, it is certainly a sign of the times.

But all of this must be evaluated in terms of what it means to the individual communication company. The impact of data transmission on these companies will become greater than is yet realized. Even the development of the SAGE system caused many large companies to realize that their plant was lacking in many respects. Yet, remember, the SAGE system was designed to work with existing telephone plant, and did not contemplate the use of highly refined circuits. But when it came to installing circuits, some companies were hard pressed to provide adequate facilities.

Data transmission equipment today is being designed to detect errors in transmission, and either stop transmission or repeat the signal when an error occurs. However, we must realize that, remarkable as such equipment may be, it is not the objective. A data circuit that stutters continually over errors is of no use to anyone.

Trouble on data transmission cir-

cuits falls into two principal classes —noise and phase delay. Noise of an impulse nature usually causes little interference on a voice circuit, because it appears as clicks or pops which may be masked by an earnest conversation. Impulses of this nature on a data circuit may register as false pulses, and actually cause a wrong message to be transmitted. Impulse noise of this sort may enter the telephone plant from outside sources, but is very likely to arise in the telephone switching equipment itself. Poorly filtered dial equipment which is connected to cable pairs may render a whole cable useless for data transmission.

Detection and identification of such noise can be made with a cathode ray oscilloscope, which shows visually pulses which might be ignored by the ear.

Phase or envelope delay, the other devil which plagues data transmission, is a different matter. In order to send data pulses over voice circuits, they are usually converted to an audio frequency or frequencies. These tones may be keyed on and off, modulated or shifted in frequency in order to carry the data. In highly sophisticated systems like the Collins Kineplex, phase-shift is also employed to get an almost unbelievable number of data circuits on a single telephone circuit.

However, a characteristic of wire circuits is that they do not always transmit all frequencies at equal speed. This is because capacitance or inductance along the line, advances or retards the phase and all frequencies do not arrive at the destination together. This can be fatal for data transmission. This condition was noted in the early days of telephotograph, and means for detecting and correcting it were developed.

Actually, the trouble arises from simple enough causes, but at present requires extensive measuring equipment to detect, and may require extensive plant rearrangement to correct.

For instance, most long voice frequency cables are equipped with loading coils at intervals. These are lumped inductances which offset the distributed capacitance of the cable pair. For proper operation, they should be placed at the exact spot where the inductance of the coil will offset the capacitance of a given length of cable. In the construction of outside plant, this was not always expedient. For instance, an existing manhole would be used to contain the coils, rather than dig a new one. Thus, these particular coils might be located incorrectly for ideal operation.

In many cases this situation may occur in a plant that was placed years ago and on which inadequate records exist. Along these same lines are the cases where loading coils of incorrect size were installed, or where through errors in splicing, the coils were incorrectly connected or not connected at all.

Rehabilitating such plant for data handling can become a tremendous job, which may be well beyond the means of some communications companies. Of course, their service would improve, even to the voice customers, by the repairs; but from a realistic point of view, many companies simply cannot afford to rehabilitate their entire plant.

The correction of mislocated loading coils does not always mean physically moving the coils. Sometimes a circuit can be corrected by

adding capacitance. For instance, if the nearest loading coil must of necessity be closer to the office than good design indicates, the cable can be lengthened by festooning the extra footage in the central office cable vault.

Another trick to correct an existing cable is to half-tap a stub of cable of the required length to the existing cable, using the stub simply for the parallel capacitive effect it will have on the pairs.

In other cases, individual pairs may be corrected by adding bridging capacitors across the pair at the distributing frame.

These remedies sound simple enough, and indeed the suitability of a circuit for data transmission can often be determined with ordinary testing equipment such as may be used for acceptance tests on the particular type of plant involved. In fact, one may make a sarcastic aside and say that if the plant was given proper acceptance tests in the first place there would be no trouble with data transmission now.

The direct measurement of envelope delay on a cable pair, if one needs a reading of the actual delay in microseconds, involves the use of expensive testing equipment. However, simple loss *vs.* frequency run will show if potential trouble exists in this respect. Also, a square wave generator and a cathode ray oscilloscope will show characteristics of resonance or "ringing" on a loaded cable pair which a skilled operator might translate into troubles which would affect data transmission.

In connection with the mislocating of loading coils, this can often be determined by simple electrical tests from one end of the cable. The Bell System has charts and specifications showing how this is done.

As a writer and editor, my principle interest is in the spread of knowledge, and the presentation of facts in a simple manner. While the literature presently contains much of an engineering nature on this subject, I believe the present need is a simplified explanation of the problems of data transmission, how to test for them, and most of all how to fix them.

In the early days of radio broadcast, it was customary to "equalize" a circuit for broadcast when the studio requested it, by applying circuit elements which would result in a reasonably flat response of the range required. This was usually done by engineering or technical personnel.

However, today, many small companies do not have this type of talent on the payroll. The need, therefore, is a set of "directions," if you please, so that the ordinary telephone man, the man in the overalls can test a circuit for data transmission, and make the necessary corrections if this can be done by adding elements to the circuit.

But I must stress again that of prime importance to the small communication company is the knowledge of what to do to correct a given problem. A user will not need a fancy instrument to tell him that a circuit will not handle data. The first time he tries to transmit data, he will find this out. What he needs is something that will tell him what to do about it. Considerable of the experience of the past is recorded in the Bell System practices, because of that company's experience with telephotograph. No doubt many of the testing techniques will be republished in the future in other publications which are more available to the small operator.

TELEPHONY recently ran a series of articles which covered many aspects of data transmission, and more will be published as new methods become available for publication. Perhaps we should some day look forward to a booklet or reprint on the subject which will adequately tell the telephone man how to find his trouble and how to fix it. Certainly, this information must be made available to the small telephone company and the railroad, and the oil companies, if future business machine data is to flow smoothly through the nation's networks of wire.

I would like to close with a word of warning to those who may think they can get along by giving a service which is "good enough." In the United States, there are now established an assortment of industrial and business radio services. In addition there is the "citizens radio" service. Any individual can qualify for installing a radio transmitter if he has nothing more than the desire and the money. Simply translated, this means that many firms will be tempted to install radio rather than pay telephone rates, and failure of the telephone company to be able to provide adequate service is a sure invitation to such companies to provide their own facilities.

This, in effect, means competition for telephone companies, and indeed, some companies have already felt this where much of their choice toll traffic flows over railroad or oil company microwave systems.

It, therefore, may be a matter of survival to the small operator.

As Electronics Editor of TELEPHONY, and as a spokesman for the small telephone company, I call upon those who have the required knowl-

edge of adequate facilities for data transmission to publicize this information as widely as possible, in order that the entire industry may benefit from it.

INTERFERENCE

IF YOU have been plagued by interference on your radio and television ever since the thing was invented, be of good cheer. The Army is about to do something about it.

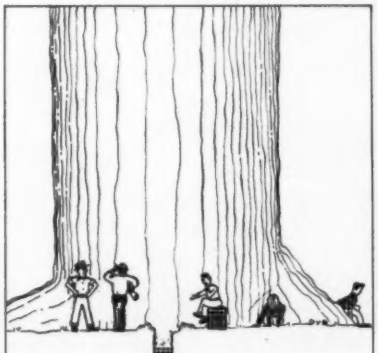
The density of radar, missile guidance, communications, and other devices already in use by the Army has reached a point where the devices threaten to jam each other almost as effectively as any enemy could, according to *Control Engineering*.

Each piece of equipment may receive hundreds of undesired signals as well as the intended one and as a result the Army will spend millions converting a 270-mile stretch of Arizona desert into a giant electronic proving ground.

More than 15,000 pieces of equipment eventually will be set up in the proving grounds. The facility will establish roughly a 60-mile square desert and mountain tactical area to match in size the average theatre of operations expected for an Army Corps.

GOOD SHIP FANTASTIC

THE BELL Telephone Laboratories, which recently built a miniature Atlantic Ocean in their backyard to test cable with, now has a ship sitting on a mountain top. Of course, it looks more like a gallows than a ship, but as far as the Bell Laboratories are concerned it is just what they need to develop new shipboard equipment and methods for handling underwater cable.



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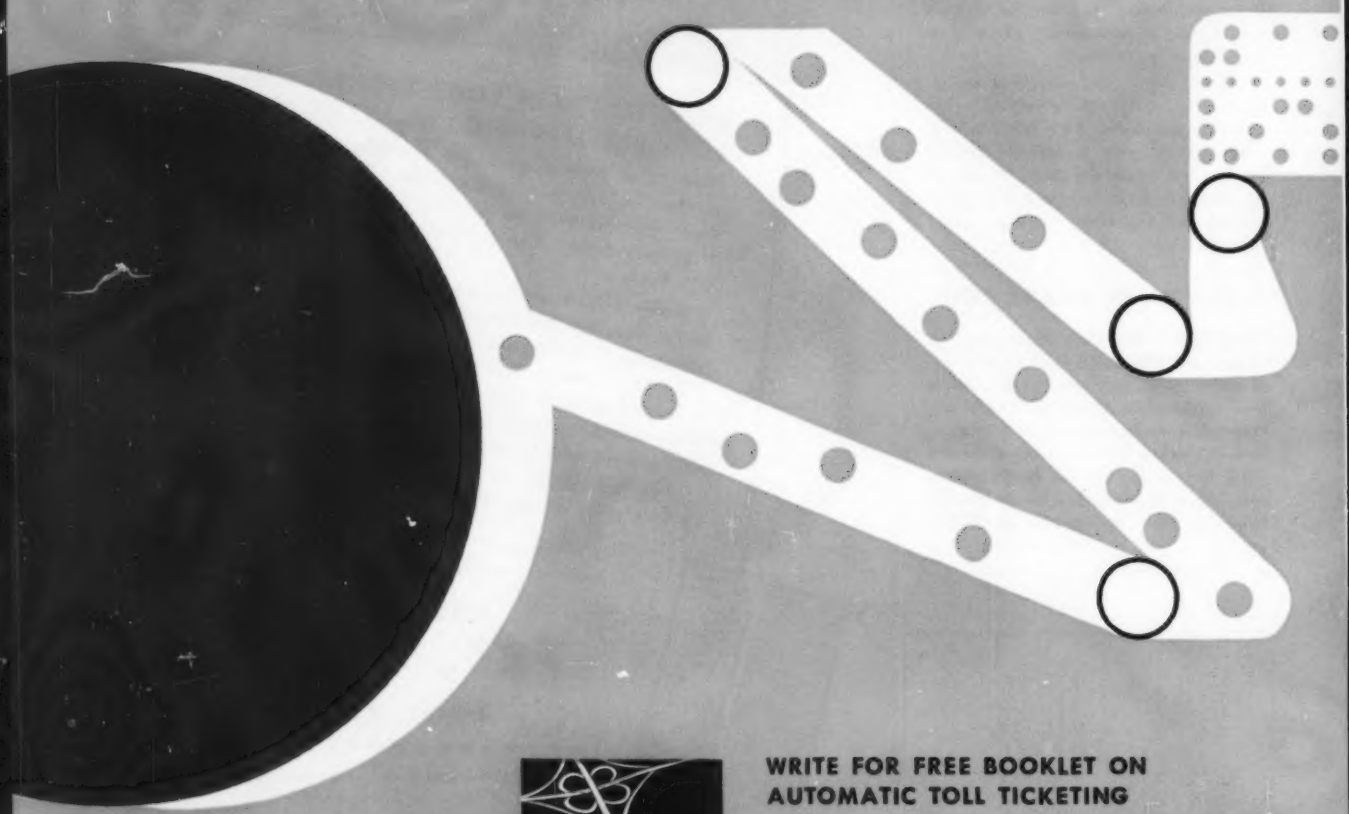

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Get the full facts on automatic toll ticketing. This new 8-page booklet explains how you can increase revenue and reduce operating costs with automatic toll ticketing. Explains in simple terms how toll ticketing equipment processes calls. Ask for Circular 1876-A. Write Automatic Electric Sales Corporation, Northlake, Illinois. Or call, Fillmore 5-7111. In Canada, Automatic Electric Sales (Canada) Ltd., 185 Bartley Drive, Toronto 16.

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it's a fact!

10% of the Independent dial telephones in the United States are served by Strowger Automatic Toll Ticketing. Introduced in 1948, SATT quickly gained acceptance among Independent telephone companies as the ideal method of handling toll calls without an operator.

Shown at right is a representative list of exchanges served by SATT. Visit any of these exchanges. Ask the owners if SATT has reduced costs and increased income. Convince yourself. Then get in touch with us. We'll be glad to help you in any way possible.

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Ft. Myers

ILLINOIS
Belvidere
Des Plaines
Flora
Harrisburg
Marion
Park Ridge
Pekin

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Greencastle

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LaRose

MICHIGAN
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Owosso
Temperance

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David City
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Courts and Commissions

Ore. Judge Sets Aside Order; Rules for PT&T

An order setting aside a $4,850,000 annual rate increase by Pacific Telephone & Telegraph Co. was recently overruled by Marion County (Salem) Circuit Court Judge Val D. Sloper.

The history of the case dates back to May 28, 1958 when the Pacific Telephone & Telegraph Co. filed for increased rates with the then Oregon Public Utility Commissioner, Howard Morgan.

The company presented its case on Sept. 9 and 10, 1958, and hearings were completed on Dec. 18, 1958.

On Jan. 12, 1959, an order was signed by Commissioner Morgan granting the company only $759,097, about 16.9 per cent of the company's request. Commissioner Morgan's order disallowed $6,194,114 of the company's intrastate rate base and $423,328 of the company's intrastate expenses by adopting a new method of separations.

In making its separations, the company states it followed the uniform NARUC-FCC Separations Manual.

The company filed suit attacking these disallowances in Marion County Circuit Court on Feb. 11, 1959 (TELEPHONY, Feb. 28). The case was argued on July 13; and on Oct. 9, Judge Val D. Sloper decided the suit in favor of Pacific T&T by upholding its contention that all separation adjustments made by Commissioner Morgan were arbitrary and unlawful.

Proposed findings of facts, conclusions of law, and a decree implementing the court's decision were not before the court for consideration.

Under Oregon law, the present Public Utilities Commissioner, Jonel C. Hill, is given the right of appeal to the state supreme court.

AT&T Asked to File Rates on Fax-Mail

The Federal Communications Commission Nov. 14 was reported as having cleared the way for the Post Office department to begin experimental sending of letter mail over the airwaves by facsimile techniques (TELEPHONY, *In the Nation's Capital*, Nov. 7).

Facsimile permits the reproduction of written matter at remote points through the transmission of signals over wire lines or by radio.

The FCC acted by telling American Telephone & Telegraph Co. that it can file on less than 24 hours notice the rates it will charge the Post Office for use of its facilities in the experiment. An FCC announcement said the Post Office will be transmitting facsimile mail, or Fax-mail, as it has been named, between Washington and Detroit and Washington and Battle Creek, Mich., with the transmission going both ways.

Raise Reconsideration Denied Florida Cities

The Florida Railroad & Public Utilities Commission on Nov. 12 refused a petition by the city of Tallahassee and other municipalities to reconsider a $585,195 rate increase granted Southeastern Telephone Co., Tallahassee, (TELEPHONY, Oct. 10).

The cities had asked for reconsideration on the following three grounds which were denied:

(1) That the commission failed to deduct $297,000 (reserve for deferred income taxes) from the company's rate base.

The commission said it took the view that the tax liability is merely deferred and that it has been taking this view in rate cases. "Nothing," it said, "has been submitted to the commission to change its views."

(2) That the decision should have been based on the debt ratio which the company has contracted for in the future.

The commission said, "It seems to us that the better practice, in fact, the only legally sound practice, is to use the debt ratio at the end of the test period, just as we considered all of the other operating statistics during the test period.

"If a current debt ratio is to be used, then it would necessarily follow, we think, that current operating figures also should be used. That, of course, is impracticable and no regulatory commission could ever dispose of rate proceedings, because before the complicated task could be completed, current figures would have become obsolete, and the commission would be confronted with new bases for its decision; thus the second ground of the petition, in our opinion, is without merit."

(3) That average investment during the test period, rather than the year-end figures, should have been used.

The commission said there is nothing in the record to justify any other approach than use of the year-end figures.

OK Injunction for General Of SW in Texas Case

The requested injunction by the General Telephone Co. of the Southwest, San Angelo, against the Jacksonville, Tex. telephone rate ordinance (TELEPHONY, Oct. 17) has been granted by District Court Judge James H. Moore, it was reported on Nov. 9.

The effect of granting the temporary injunction is to permit the company to set its own rates in Jacksonville, the report stated.

In a 5½-page judgment, Judge Moore reviewed a part of the evidence presented during the Oct. 26-27 hearings, when company officials and the county tax assessor-collector testified.

The judge overruled the city's plea in abatement, in which the jurisdiction of the court to hear the case was questioned. The city had alleged in its plea that the court had no jurisdiction because there was provision, in the rate ordinance of Apr. 9, for a rehearing on General of the Southwest's rates after Sept. 30.

Judge Moore ruled that Jacksonville had no authority under its charter to extend the time for a rehearing. Under the charter, a utility may file suit in court 60 days after the date of its application for a rehearing on rates.

On June 17, the company had asked for a rehearing earlier than Sept. 30, but this was not granted by the city,

and on Sept. 24, the company filed for an injunction, alleging that the rates in the Jacksonville ordinance did not allow a fair return on its investment.

Judge Moore cited in the judgment an appeals court ruling in the case of the Railroad Commission vs. the Houston Natural Gas Corp., which says that the fair value of a utility's investment is "a reasonable balance between original cost, less depreciation, and replacement cost new, less an adjustment for present age."

Under this ruling, General of the Southwest placed its investment in Jacksonville at $838,624.12 for local service.

A transcript of testimony presented by James M. Honaker of Frankfort, Ky., the city's rate consultant, at the Sept. 9, 1958 hearing, placed the company's investment at $750,000, a figure which did not include a sum of $55,000 for equipment which the company was then installing.

General of the Southwest stated in its testimony that the rate of return permitted on its investment by the city's rate ordinance was only 4.26 per cent.

In Judge Moore's opinion, the calculated return of $36,875.33 per year, which was also entered as testimony during the hearing, would provide a 4.9 per cent return on the city's figure of $750,000.

Moore added that, according to Mr. Honaker's testimony on Sept. 9, 1958, a return of 6.13 to 6.50 per cent would be fair on the company's investment. The company contended that a 7.25 to 7.50 per cent return is needed.

Judge Moore pointed out that neither the District Court nor any other court has authority to set telephone rates in Texas. He urged Jacksonville City Council members and the company to try to resolve their differences without further court action.

General of NW Reports Sale of $2 Million in Bonds

The sale of 2 million dollars of the company's first mortgage bonds was announced on Nov. 16 by A. J. Barran, president of the General Telephone Co. of the Northwest. The proceeds from the sale will be used to pay off short-term bank loans.

Mr. Barran said that these funds are necessary to underwrite the expansion and service improvement program the company has planned for 1959-1960. Additional financing will be done in the future, since the total two-year period calls for a new money requirement of about 6 million dollars.

"In May last year, the same amount of bonds were sold with a 4.25 per cent cost rate compared with 5.50 per cent on the current issue, or about a 30 per cent increase," Mr. Barran pointed out.

Mrs. Joseph Lugar of St. Marys, O. (left) compares her new telephone with an old-time set held by R. Karl Judy, who was manager of St. Marys exchange at the time the old telephones were in use. Mrs. Lugar and her husband (third from left) were guests of honor at a recent celebration in St. Marys; General's 200,000th telephone in Ohio was installed at the Lugars' home. Looking on are (left to right): Clare E. Williams, president of General of Ohio; Daniel W. DeHayes, executive secretary of Ohio Independent Telephone Association, and Mr. Lugar. Ohio's first dial system was installed in St. Marys in 1903 when the exchange served 127 subscribers. Today it serves upwards of 3,000. Acquired by the General Telephone System in 1955, the St. Marys exchange just prior to that was a Gary Group property.

OK Raise for EAS, Service Transfer in Kan.

The Kansas Corporation Commission has authorized United Telephone Co. of Kansas, Inc. to raise rates at Willis and Powhattan to provide for extended area service.

Residence rates will be increased 25 cents monthly at Willis and 15 cents monthly at Powhattan to pay for this service.

Subscribers at Whiting and Muscotah voted not to continue toll-free service between United's Horton exchange and Muscotah, and Horton and Whiting.

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Also in Kansas, the Vermillion Telephone Co. was authorized to cease doing business and the Blue Valley Telephone Co., Vermillion, was granted permission to serve the Vermillion exchange.

FCC OKs Microfilming Of Records

The Federal Communications Commission on Oct. 7 adopted amendments to Parts 45 and 46 of its rules and regulations, pertaining to the preservation of records of telephone carriers, wire-telegraph, ocean-cable, and radio-telegraph carriers, to permit full freedom to the carriers in microfilming of records.

The FCC stated in its order that, in many respects, there is a substantial identity of interest in preservation of records between carriers and public utility regulatory bodies. "This being true, considerable room for freedom of action in the matter (microfilming) may be left to utilities without risk to the public interest," the commission stated.

The FCC action in permitting microfilming of records makes no change in any retention period for records, but means only that when microfilm copies are substituted for original records, the microfilms must be retained for the periods specified by the commission.

The FCC stated it is obvious that there are expense savings possible and

likely to be realized from microfilming by reducing filing space requirements; however, there are expenses related to microfilming which would not otherwise be incurred.

Since no rule under consideration by the FCC contemplates that microfilming shall be mandatory in any case, the commission stated that "carriers naturally will not resort to microfilming except where economic justification is found."

Five Minn. Companies Get Rate Increases

The Minnesota Railroad & Warehouse Commission on Nov. 10 granted rate increases to five companies as follows:

The Red River Rural Telephone Association, Abercrombie, N. D., was authorized to raise rates at its Rollag, Minn. exchange. The company expects to convert Rollag to dial service by August, 1960 with the aid of a $200,000 Rural Electrification Administration loan.

Extended area service will be provided between Rollag and Hawley, Minn. and Rollag and Barnesville, Minn. which will permit a Rollag subscriber to talk with approximately 1,533 other stations.

The Red River company serves 537 stations in North Dakota through exchanges at Abercrombie, Colfax and Mooreton. It will serve 407 stations in Minnesota on completion of its rehabilitation project. It serves rural stations in the Barnesville area through a switching agreement with the Barnesville Telephone Co.

With the new rates, net operating revenues will increase from $54,618 to $75,075, giving the company a net income of $12,089 or a 2.06 per cent rate of return on its rate base of $585,590. Under its old rates, the company had a loss of $7,636 yearly.

Under the old rates, only multi-party rural service was offered. Dial service to the Hawley exchange was $3.00 and magneto service was $2.00.

Rates, to go into effect when the exchange has dial service, are as follows:

One-party business	$7.50
Two-party business	6.75
Multi-party rural business	6.50
One-party residence	5.75
Two-party residence	5.25
Four-party residence	4.75
Multi-party rural residence	5.75

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The Sacred Heart Telephone Co. was granted a rate increase to meet a $4,000 yearly wage increase for its operators. The raise is necessary to meet employment competition from local manufacturing plants, the commission found.

The company serves 473 stations, of which 217 are switchers. A raise in switching rates for these subscribers from $1.00 to $1.50 per month was granted in order that these subscribers pay a more equitable share of the costs of operation, according to the commission.

Switcher station costs are estimated to be $29 per station. At the old rate, switcher station revenues were $21.36 yearly per station.

Under the new rates for all subscribers, the company's net revenues will rise from $19,955 to $24,946. Net income will increase from $1,723 to $2,686, giving the company a 5.60 per cent rate of return on its rate base of $47,842. It formerly earned a 3.60 per cent rate of return.

Old and new rates are as follows:

	Old	*New*
One-party business	$5.50	$7.50
Two-party business	4.50	6.50
Multi-party rural business	4.00	6.00
One-party residence	3.50	4.50
Two-party residence	3.00	4.00
Four-party residence	2.50	3.50
Multi-party rural residence	3.50	4.50

•

The St. James Telephone Co., which is converting its plant to dial operation with cut-over scheduled for May 15, 1960, was granted a 5.92 per cent rate of return on a rate base of $685,884 (TELEPHONY, Oct. 31). Under old rates, it earned a rate of return of 2.69 per cent.

The company, which serves 1,865 local and 657 rural stations, operates exchanges at St. James and Godahl. It plans to offer extended area service between these two exchanges.

With the new rates, the company's net income will increase from $18,482 to $40,663.

Rates, to be effective with conversion, are: One-party business, $7.50; two-party business $6.75; multi-party rural business, $5.50; one-party residence, $4.75; two-party residence, $4.25; four-party residence, $3.75; multi-party rural residence, $4.25.

•

The Starbuck Telephone Co., which has increased its plant investment by $30,000 since Nov. 1, 1954, was allowed a rate increase.

The company serves 835 stations, of which 440 are local and 395 rural.

With the raise, its net income went up from $2,295 to $5,103. The company's rate of return on its rate base of $100,264 will go up from 2.28 per cent to 5.08 per cent.

Old and new rates are as follows:

	Old	*New*
One-party business	$5.25	$6.25
Two-party business	4.25	5.25
Multi-party rural business, common battery	4.25	4.75
Multi-party rural business, magneto	3.75	4.25
One-party residence	3.75	4.50
Two-party residence	3.20	3.55
Four-party residence	2.35	2.60
Multi-party rural residence, common battery	3.85	4.10
Multi-party rural residence, magneto	3.35	3.60

All rates are gross with a discount of 25 cents allowed if paid on, or before, the 15th day of the month in which service is rendered.

•

The Winthrop Telephone Co., which converted to dial operation in September, 1959, with the aid of an REA loan

Still Ahead

During his American visit, Soviet Premier Khrushchev made it clear that one of his primary goals is a Soviet economy which will out-produce that of the United States. And, the intimation was, that this will be accomplished in the foreseeable future.

***U. S. News & World Report* has summed up comparative data, based on official sources, concerning pay and output here and in the Soviet Union.**

For example: Average U. S. factory pay is $4,700—in Russia it is about $1,000, based on buying power.

The average American farmer produces enough for himself and 20 others, with much to spare as the huge farm surpluses prove—while the average Russian farmer produces enough for himself and only four others, with nothing to spare. And the output of the U. S. factory worker is two and one-half to three times that of his Soviet equivalent.

The magazine says: "So the Khrushchev problem boils down to this: inefficient farming, meaning a limited supply of workers for other jobs . . . a shortage of modern equipment, as well as manpower, for nonfarm production . . . low productivity of the work force . . . defense needs that strain the country's capacity to produce."

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amounting to $295,000, was granted a rate increase.

The company provides service to 531 local and 229 rural stations.

With the raise, its operating revenues will increase from $42,455 to $51,002.

Net income will go up from $3,821 to $11,545, thereby increasing the rate of return on the $317,153 rate base from 1.20 per cent to 3.64 per cent.

Old and new rates are as follows:

	Old	*New*
One-party business	$6.00	$8.25
Two-party business	5.00	7.00
Multi-party rural business, common battery	5.00	5.75
Multi-party rural business, magneto	4.75	—
One-party residence	3.75	5.00
Two-party residence	3.25	4.25
Four-party residence	2.75	3.50
Multi-party rural residence, common battery	3.75	4.50
Multi-party rural residence, magneto	3.50	—

PT&T Withdraws Rate Raise Request in Wash.

The Pacific Telephone & Telegraph Co. on Nov. 10 withdrew from the Washington Public Service Commission its request for a 9-million-dollar rate increase (TELEPHONY, June 27).

Roger Miller, Spokane district manager, said the request was withdrawn because of the company's increased volume of business and "generally favorable business conditions."

Flat Rate Rural Service Offered in Virginia

The Virginia Corporation Commission has granted Farmers' Mutual Telephone System of Edinburg, authority to offer four-party service in rural areas at a flat rate of $4.50 for residence service and $6.50 for business service.

This is the first company in Virginia to ask for authority to furnish four-party service in the rural areas at a flat rate.

The flat rate will apply throughout the Farmers' Mutual system's territory and is being offered on an experimental basis until Jan. 1, 1962.

With the improvement of telephone service in Shenandoah County, Farmers' Mutual has found that telephone service in the rural areas is increasingly being used. In fact, according to a company spokesman, a line with eight subscribers now is used more than the old magneto line with 15 to 20 subscribers. Consequently, a lot of subscribers cannot get their calls through as easily as they could with the old system. However, according to the company, at the present rate of $2.25 for multi-party service, very little can be accomplished without changing all rates.

The four-party service arrangement allows those subscribers who want better service to obtain it at an increased cost. The service is offered on an experimental basis since the actual demand for this improved service is not known. It could eventually lead to the establishment of private lines for all subscribers which is the ideal answer to good telephone service, but not the economical answer for the company, or the subscribers, at this time, the company states.

OK Nebraska Stock Issue

The Nebraska Railway Commission on Nov. 10 authorized Chrisp's Telephone Co., Paxton, to issue and sell 226 shares of 2 per cent callable preferred stock at a par value of $100 per share. The company will use this to modernize and extend telephone service for 83 switching subscribers and 20 company subscribers in rural areas in its Wallace exchange. Total cost of this program is estimated at $50,000, part of which will be financed through a loan from the Stromberg-Carlson Co. The Chrisp's company also serves Paxton and Madrid.

TB Is Not Licked

Almost every motorist gets a fall check-up on his automobile and has it winterized for the coming cold weather. Yet, not 10 per cent of these Americans will check themselves against an insidious enemy that lies in wait to infect them in every crowd—TB.

In 1958, 63,336 new active cases of tuberculosis were reported in the continental United States—one every six minutes. The largest number of these sufferers were men.

TB is a disease without signs or symptoms in the early stages. The only way it can be detected is through chest X-rays and tuberculin tests because there are no apparent symptoms. Outward symptoms—"feeling bad"—do not appear until the disease is in a moderate or far advanced stage. Last year, approximately 12,000 people in the United States died of TB.

The Christmas Seal campaign, beginning Nov. 16 and running through December, which finances the work of the National Tuberculosis Association, provides for free chest X-rays for school children and for anyone who is in reach of a touring mobile unit.

These free chest X-rays are protection for everyone because every case discovered is one less source of infection.

Help Fight TB

Use Christmas Seals

These dollars also buy medical research to discover a vaccine to prevent TB in humans, to find a drug which will kill the tubercle bacillus instead of just arresting it, to rehabilitate the disease's victims and to educate the public to its dangerous potential.

"Buy and Use Christmas Seals. Help Fight TB."

N. C. City Protests Billing, Await Franchise Law Ruling

The mayor of Henderson, N. C., on Nov. 20 charged that the North Carolina Utilities Commission was violating a recently enacted state law by allowing the city to be billed for telephone services (TELEPHONY, June 6, 1959).

Mayor Carroll V. Singleton in a letter to Commission Chairman Harry T. Wescott said that the Carolina Telephone & Telegraph Co., Tarboro, "is continuing to bill the city of Henderson for services which it is bound under the franchise granted it by the city" to render without cost. He said such practices are "in contravention" of a law passed by the 1959 Legislature which validated agreements giving free service to cities in exchange for use of public lands for rights-of-way.

He said that "it appears this act is clear in its intent that charges under these agreements should be discontinued." He added that the Carolina company told him it had billed the city under an order from the commission and that the commission had verified that it had issued such an order.

Chairman Wescott said the matter was "out of our hands" since the order

(Continued on page 42)

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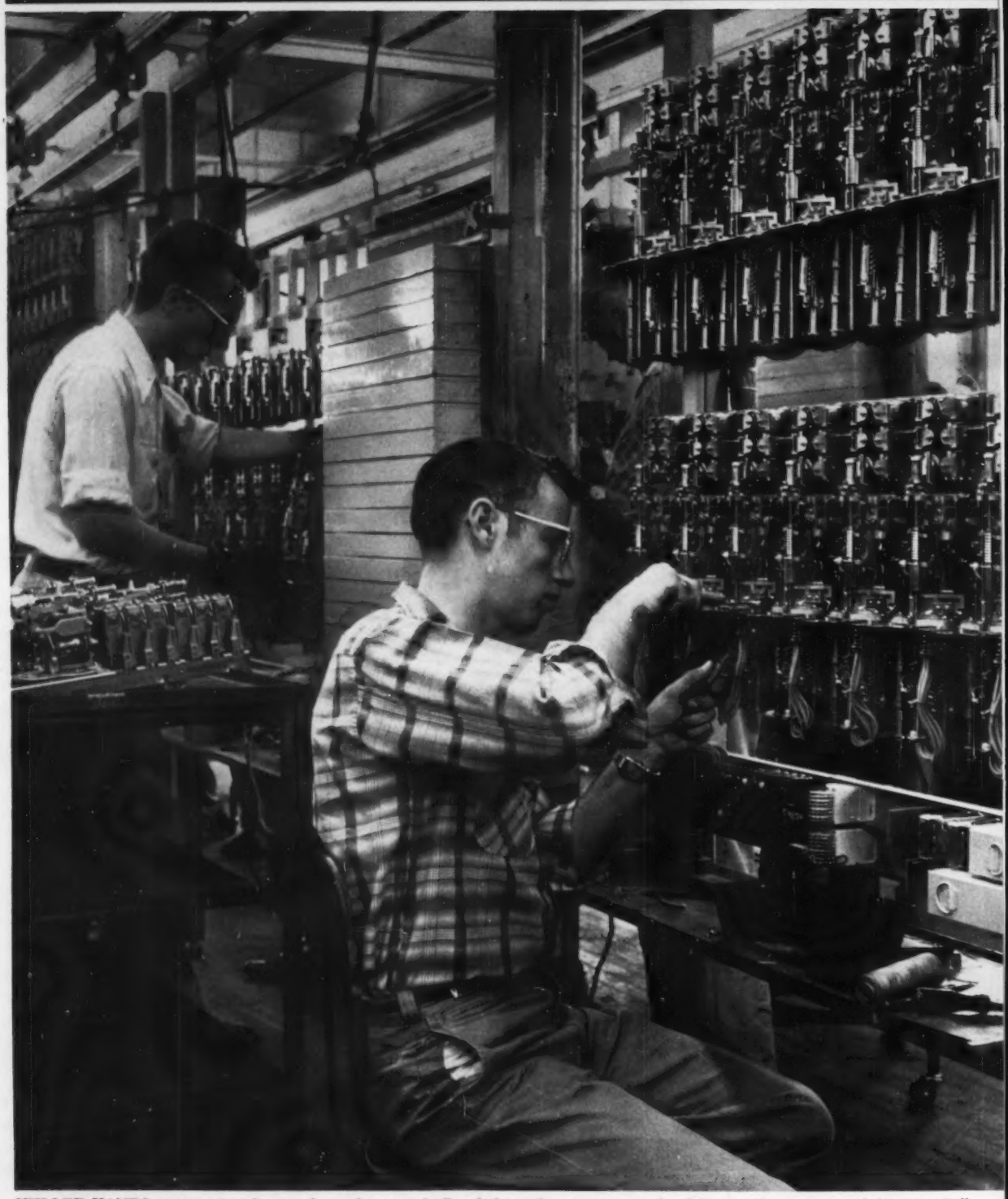

SKILLED HANDS prepare giant frames of complex central office dial switching equipment slated for installation in one of the many Bell telephone companies across the nation. This equipment and telephone cable are the principal products Western Electric makes in Chicago.

CHICAGO, ILL.

Nation's leader in grain trading, meat packing and rail handling, Chicago is the leading maker of Bell telephone equipment, too... at Western Electric's Hawthorne Works. And Chicago shares in the benefits this telephone job provides.

Chicago sprouted from a small Lake Michigan settlement into a vigorous metropolis in just over a century. And Western Electric grew with it, for it was 90 years ago that our newly formed company first came to Chicago.

Western Electric feels itself an integral part of this great city for over 21,000 Chicagoans help us with our job as manufacturing and supply unit of the Bell System.

Many other thousands also help as employees of our Chicago suppliers. Last year we spent almost 63 million dollars with 2,696 Chicago companies – part of our statewide supplier team of 3,719 firms.

As important as the telephone equipment we make are the benefits our work provides. These include the added business to local merchants, taxes that aid city betterment, and the active participation our people have long taken in civic and social activities.

Western Electric is happy indeed to have shared in Chicago's rapid progress and we look forward to a prosperous future together.

Besides Chicago, Western Electric has plants in 25 other cities where we also make telephone equipment for the Bell System. Last year we purchased over a billion dollars' worth of raw materials, products and services from over 30,000 suppliers located in every state. Of these, 90% are "small businesses." The things we make and buy are distributed to the Bell telephone companies through Western Electric distribution centers in 32 different cities.

Western Electric

MANUFACTURING AND SUPPLY UNIT OF THE BELL SYSTEM

PERISCOPE PEERING is the high point of a visit to the Chicago Museum of Science and Industry. Western Electric's Arthur Wiseman, Jr., and family find Chicago full of delightful sights and surprises including the captured German submarine (U-505).

HIGH PRAISE from Paul W. Goodrich, President of the Chicago Association of Commerce and Industry: "Western Electric's Hawthorne Works has always been considered one of Chicago's finest industrial neighbors – a highly cooperative corporate citizen."

JUNIOR ACHIEVEMENT group of teenagers sponsored by Western Electric is supervised by W. E. employee, Herb Preppernau, as they manufacture hand cream with a lanolin base. Many of our Hawthorne Works employees devote a lot of their spare time to such worthwhile community projects and activities.

MUTUAL INSPECTION of a Western Electric part is conducted by W. E. purchasing man, S. Jenson (left), and F. Corte, President of Boyar-Schultz Company. Boyar-Schultz specializes in repairing tools and dies and is one of our 2,696 Chicago-area suppliers.

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Improved electrical qualities make practical typical subscriber loops of 14 to 15 miles with normal voltages and equipment. Also can be used for subscriber carrier.

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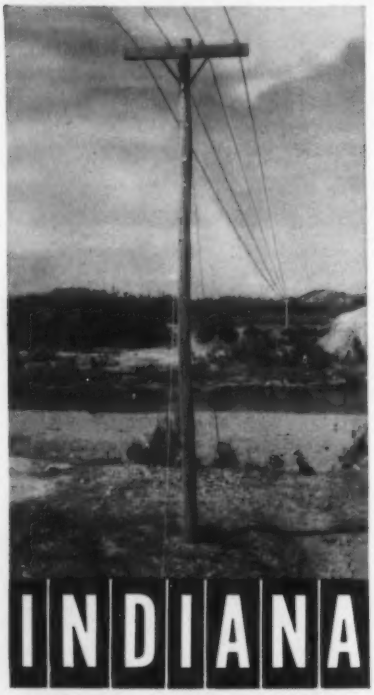

INDIANA
STEEL & WIRE CO., INC.
MUNCIE, INDIANA

invalidating the franchise agreements was appealed to the courts and is now before the North Carolina supreme court. "The records are out of our hands," he said. "As soon as the court rules on the case, we'll carry out its orders. But right now, there's nothing we can do."

The controversy, which involves many other North Carolina cities with similar agreements, began in 1958 when the commission ordered the company to discontinue such franchise agreements in all of the cities in its area.

The commission later extended the same instructions to other companies with similar agreements. The cities then banded together and succeeded in getting legislation enacted which, in effect, countermanded the commission's orders.

"It is inconceivable that the commission, a creature of the legislature, should order a public utility to violate the letter and intent of an act" of the legislature, Mayor Singleton said in his letter to Chairman Wescott.

"Since this matter has not been rectified to clear the account of Henderson with the telephone company, we will make public this obvious inconsistency in the administration of the law."

New Owners Acquire Texas Independent

Controlling interest in the Pecos & Northwestern Telephone Co., Inc., Pecos, Tex. has been sold, according to an announcement on Nov. 12 by J. Robert Scott of Pecos, one of the new owners, and Ralph Sparks, former co-owner of the company.

Besides Scott, other new owners include Bond Bradford, also of Pecos, and R. Stewart Scott of San Antonio.

New officers are J. Robert Scott, president; H. E. Messinger of Los Angeles, vice president; Bond Bradford, secretary; and R. Stewart Scott, treasurer.

The company serves 3,000 stations in Pecos and other communities including Barstow, Balmorhea, and Toyah.

The original company was founded in 1920. Dial service was installed in 1953.

Struggling to Know

"All wish to possess knowledge, but few, comparatively speaking, are willing to pay the price."—JUVENAL.

N. J. Right-to-Appeal Bill

A bill giving public utilities the right to appeal to the New Jersey Public Utilities Commission against rulings by local governing bodies and planning boards was given final passage by the New Jersey legislature and sent to the governor for signature. The measure was sponsored by Sen. Frank S. Farley. New Jersey utilities have always had the right to appeal a local action to the courts.

Authorize Raise, Interim Rates, One Loan in Kan.

The Kansas Corporation Commission, it was reported on Nov. 19, has authorized the Reno Telephone Association, Inc., Hutchinson, to increase its rates by $15,419 annually in 10 of its 15 exchanges.

A commission spokesman stated that the rate increases will affect the following exchanges: Abbyville, Arlington, Cedar Point, Cunningham, Langdon, Partridge, Plevna, Pretty Prairie, Saffordville, and Sylvia.

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In other actions, the commission gave permission to the Holyrood Telephone Co., Inc. to borrow $102,708 privately to cut over its exchange to dial service.

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Interim dial rates were granted to the Rural Telephone Service, Inc., Lenora, to be collected under bond at Selden, Rexford and Zurich, which are to be cut over, beginning about Dec. 1.

Arkansas Company Asks Stock Sale for Expansion

The Mountain Home Telephone Co., Inc. asked the Arkansas Public Service Commission on Nov. 17 for permission to sell 300 shares of common stock worth $42 a share to its stockholders; to declare a dividend of 75 shares for the stockholders; and to offer 250 shares of preferred stock at $100 per share to the public.

In its petition, the company said it planned to use $17,000 of the proceeds from the stock sale to pay for materials used in plant expansion.

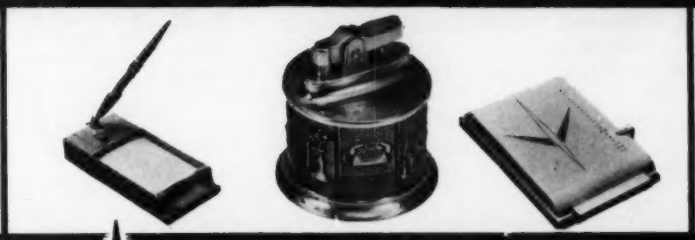
The application also stated that the company plans to cut over to dial its Mountain Home exchange, to expand its facilities, and construct a new building.

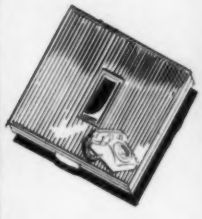
SW Bell to Withdraw Rate Request in Texas

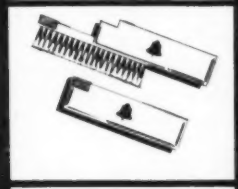
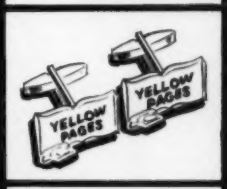
The Southwestern Bell Telephone Co. plans to withdraw the rate application it has had on file with the Corpus Christi (Tex.) City Council, District Manager Stanton Bell said on Nov. 12 (TELEPHONY, May 16).

Mr. Bell said that the company, which had won a temporary injunction in Texas District Court in April, allowing it a 1.2-million-dollar increase, would give a fair trial to a $700,000 raise allowed by the council.

The rate ordinance, passed on Apr. 29, had voided the injunction, and the





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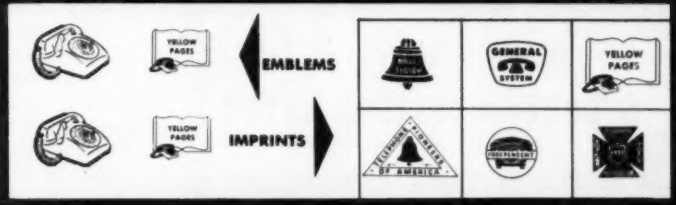


company had filed a new rate application. The council refused to hear the new filing.

Manager Bell said the withdrawal was a result of several conferences with Corpus Christi Mayor Ellroy King.

Sample, old, present, and proposed rates are:

	Old	Present	Proposed
One-party business	$10.90	$13.00	$14.50
One-party residence	4.75	5.00	6.00

Donnelley's Yellow Pages Contest Pays Dividends

A Chicago career woman has been named grand prize winner of a "yellow pages" advertising contest in Illinois sponsored by the Reuben H. Donnelley Corp., Chicago, classified telephone directory advertising company.

Her prize: one year's cash dividends on her selection of $100,000 worth of stocks.

The lucky contestant is Shirley B. Miller, legal secretary at the Chicago law firm of Grossman & Grossman.

She said that the top prize caught her fancy when she saw the contest announcement in a Chicago newspaper. Requirements of the contest were to match up a list of typical home repair problems (samples: "window cracked," "rug spotted," "tree limb broken.") with appropriate yellow pages classified service and repair headings. Contestants also had to complete a rhyming slogan.

COVER PHOTO

Pictured with Mrs. Miller on her visit to the Allyn company offices are John H. Riley, left, partner in the firm, and Lewis W. Reich, vice president.

The contest was open to residents of Illinois and Lake County, Ind. Second prize, a combination refrigerator-freezer, went to Mrs. Dolores Weaver of Alton, Ill.

Contest rules saved Mrs. Miller from what might have been the awesome task of choosing from among the 1,502 issues listed on the New York Stock Exchange. Instead, she selected her $100,000 stake from a list of five issues (Aluminum Co. of America, Ford Motor Co., General Electric, Standard Oil of New Jersey, and United States Steel).

Mrs. Miller will not know the precise amount of her cash winnings for one year, the time it will take for the company or companies of her choice to pay their full annual dividends. At the end of the year, she will receive a check for the full amount from the Donnelley company.

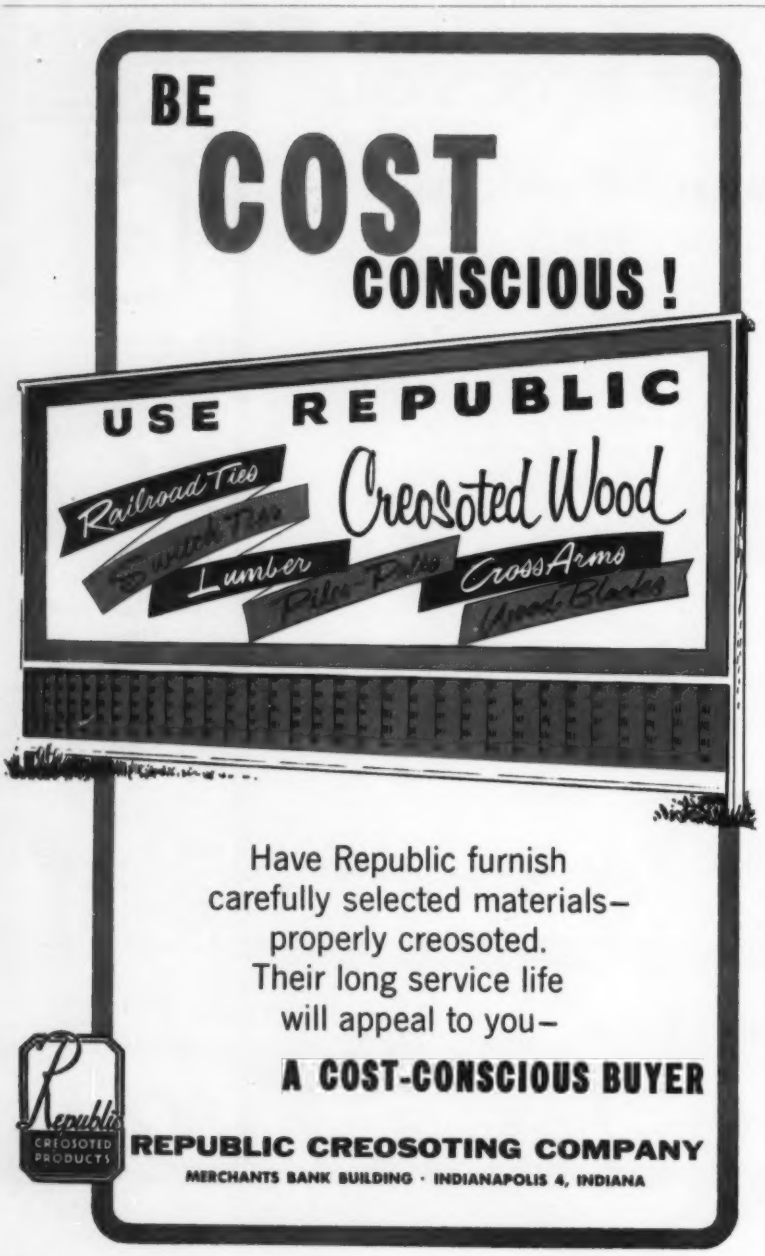
When she collects her dividends next year, Mrs. Miller said, she hopes to reinvest most of the prize money for her 7-year-old son's future education.

Refuse to Yield Line For N. J. Ambulance Call

The police of Millburn, N. J. on Nov. 14 were reported to be investigating a complaint by Dr. Marvin Becker that two women on a party-line telephone refused to yield the line so that he could summon an ambulance for a heart attack victim.

Dr. Becker stated that he was treating Mrs. Sophie Wetzel, and attempted to make the emergency call. He told the police the women on the line said they didn't care "anything about any patient."

The victim's daughter, Mrs. Fred Hammerle, went next door to make the call. Mrs. Wetzel was said to be "in fair condition" in the Beth Israel Hospital.



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How long is a foot?

"Quite obviously, sir, a foot is just a foot. You have a question?"

Who's asking?

To a jet pilot, a foot is too small to consider; to a football team, fourth down and goal to go, it can be the enormous distance to victory. An extra foot on your car may make *you* feel important, but on your lady's hemline, it makes *her* feel out of date.

Some recognized standard for the foot became important to early Greek mathematicians as they attempted to apply Euclidean geometry to the problems of their day. The Romans—on the other hand—were a "foot-loose" gang with half a dozen accepted standards: longer when buying, shorter when selling!

Could Be Chaos

Imagine the chaos in today's world of science and engineering unless there were agreement on a common standard. Yet up until this past year there were *three separate standards for the inch* in the United States, Canada and Great Britain . . . and a foot multiplies this variable by 12. If two teams, for example, had started laying a trans-Atlantic cable from opposite sides by dead reckoning alone, using their different standards, they might have passed without seeing each other!

Telephone men know these ships wouldn't miss: communications would see to that. But by the same token, communication exists only as two or more parties are connected through relationship to some common standard. We recognize certain laws and constants, use measuring devices to check against these. Today, as we move further into the field of electronics, new instruments are checking against a revised set of standards. But here's a shocking bit of news: these extraordinarily accurate measuring devices, such as are used in Stromberg-Carlson's Electronic Switching Laboratory, are shaking some of the older standards right off the shelf!

Search for New "Ultimate"

For instance, Time.

Over the centuries the ordered movement of the earth, sun and stars had been considered the ultimate in measuring time. It's just not so. In connection with our country's missile program, precision instruments have been developed which prove beyond question that the relative motions of the heavenly bodies are variable. Man-made electronic instruments, having proved the

older standards obsolete, now *become the new standard.* Only yesterday the smallest significant unit of time was the microsecond. Today Stromberg-Carlson (and others faced with a comparable challenge) makes its calculations in millimicroseconds, and reliability checks have been intensified accordingly.

The electronic era advances faster than standards can be written and verified. To halt progress would be criminal; to check findings is imperative. Faced with this dilemma, Stromberg-Carlson research and design engineers have had to develop new acceptance techniques to pilot the creative man into the unknown. This is best illustrated in relation to two projects that are destined to carry Threshold Knowledge into hardware.

Is There a Better Way?

A "Store and Forward" message-switching system concept became a Research and Advanced Development project. During the course of this project a new computer became available for system simulation in the initial design stage. Through the wizardry of this robot—able to do everything that Man can do except create—raw ideas could be programmed, accepted, modified or discarded. The acceptability of components and circuits was thus quickly determined and, using the principles of Boolean ("Yes—No") Algebra, it became practicable to substitute alternate designs until the optimum system pattern was discovered. The standards then are reduced to the simple question: "Which works best?"

Logic, Reliability . . . and Time

The Electronic Switching System for the Signal Corps posed additional problems in testing, since this project is being perfected as hardware ready for field acceptance tests. It was imperative that Stromberg-Carlson design reliability into this project, partly because of the sheer number of elements and also because common circuits are inevitable in this method of switching. Yet delivery time was also an important factor. To meet this dual requirement, test engineering was made a line function on the same level as design engineering. This move integrated the reliability philosophy with logic development from the outset.

A constant problem grew out of state-of-the-art limitations in semi-conductors. Suppliers were having difficulty meeting the rigid reliability standards (based on satisfactory performance under the worst conditions of temperature and voltage). To ease this situation without compromise in reliability, it was determined in the system study to control the environment.

Electronic Switching circuit cards are tested functionally by simulating all input and output requirements. Computer techniques are used to create tabulating cards that program these requirements automatically. Reliability is monitored through wave patterns on the oscilloscope and from current drain readings on the meters of the component tester. Various coupling networks can be provided as necessary with patch cords in the jack field.

Reliability assurance then was carried to the next step: basic circuits. These circuits were paper designed and their performance was predicted; computers played a major role in checking this performance against predictions. Whenever the test did not verify expectations—again under worst possible conditions—redesign was instituted. The proved-in basic circuits were then incorporated into logic circuits and the reliability check applied to this next step.

System Failure Minimized

The customer's specification naturally recognized failure as a possibility, since any component has an End-of-Life value. Stromberg-Carlson's concern was to keep *system* failure to a minimum: by reducing the number of common circuits as far as possible, and through accelerated Life Tests. Once again, predictions for mean time to failure under the "worst conditions" were calculated, logic combinations were then programmed, and where necessary, corrective measures made mandatory.

Thus there is confidence that in the field-test design, individual outages will not affect the system except as it makes an insignificant and temporary reduction in *grade* of service. Telephone men will be quick to see here a principle that they have long practiced and considered fundamentally sound.

The Stromberg-Carlson Electronic Switching System is a clear-cut illustration of progress outstripping formalized standards. From this system—proved and accepted—new standards will be determined.

How long is a foot? It's as big and as dependable as you need to step from here into the future.

Urge Curb in Nebraska on Plastic Directory Covers

The Nebraska Telephone Association is urging member telephone companies to take immediate and forceful action to curb the activities of vendors of plastic directory covers and other unauthorized attachments.

In his association letter of Nov. 16, Secretary-Treasurer J. Earl Nelson pointed out that a rash of directory cover sales has "broken out all over the state." Nelson reports that "at least four or five such outfits have had considerable success in selling their deal."

Nelson writes, "Companies furnishing these covers move into a town, sell, at high prices, advertising spaces on plastic covers to local businessmen and then deliver the covers by mail to users of telephone service. The covers are not attractive, and it is a little hard to see why the advertiser falls for the idea. Apparently, advertisers attach more value to space on the outside of telephone directories than had been imagined."

The Nebraska bulletin suggests that member companies take these steps:

(1) "Visit with your business people and explain your attitude and what action you propose taking if such covers are distributed (be sure they understand that the directory is your property—most business people respect property rights).

(2) "Purchase and distribute clear plastic covers, either free or at cost. Some companies sell them to the Boy Scouts or similar organizations, and they resell them at a profit.

(3) "If your directory has paid advertising, consider legal action.

(4) "Write to your customers explaining your position. We are attaching an association letter that you may use if you desire (these will be furnished upon request).

(5) "Use a bill insert explaining your position.

(6) "Use a soft, pliable paper stock for your directory cover so it will not support a plastic cover."

Nelson emphasized the importance of informing customers that the plastic covers do not come from the telephone company. Many people receiving the covers think the telephone company sent them and that they are supposed to use them, he stated.

* * *

[*EDITOR'S NOTE:* This important subject of "foreign" directory covers was discussed by LaMar S. Stoops in the Oct. 3 issue of TELEPHONY, under the title: "How About This Directory Cover Business." Since its publication, Mr. Stoops has received many inquiries for information, and also comments on his suggestion that telephone companies make plastic directory covers available to subscribers, with or without charge.]

Survey To Learn Interest In USITA Marketing Meet

Questionnaires are being sent out to Independent telephone company managements to determine if enough of them would be interested in a Marketing Seminar.

The seminar has been proposed by the United States Independent Telephone Association Marketing Committee, according to Allan R. Stacey, chairman.

Enrollment would be limited to approximately 25. Cost for instruction, lodging, meals and incidentals (excluding transportation), is expected to be between $300 and $500 per individual. The seminar could be held for five days during the summer of 1960 on one of the college campuses in the Mid-West, Mr. Stacey said.

It would be designed to give top management an understanding of effective marketing and a desire and ability to encourage a broad marketing program for their companies.

E. C. Gates, Independent Pioneer, Dies

Elnathan C. Gates, 62, of Minneapolis, Minn., Independent telephone pioneer, died on Nov. 14 following a long illness.

E. C. GATES

Mr. Gates was president of Minnesota Telephone Co., Marshall County Telephone Co., Iowa-Illinois Telephone Co. and Western Illinois Telephone Co. He also was vice president of National Telephone Co. of Minneapolis.

He was active in national and state association affairs. He was a director

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New Flush Mounting Wall Jack

In brown or ivory plastic, the SE-493A jack can be flush mounted directly in molding or wall. Four (4) spring tensioned jack holes accept standard SE283B 4 prong plug. Can be used with SE19B plate, also in ivory or brown, for attractive modern flush installation for 2, 3 or 4 wire service requirements. No conduit box necessary. SE493A $1.30 each. SE19B Plate, $.30 each. Specify brown or ivory.

NEW Outdoor Weatherproof Jack Boosts Revenues!

Subscriber demands for outdoor, backyard, or patio telephone service are growing fast. The new SE16151 Outdoor Weatherproof Jacks from SUTTLE "fill the bill" for every outdoor use. The non-corrosive, waterproof, aluminum receptacle houses the SE493A jack (above). This new jack makes an excellent extension sale-revenue booster. Another SUTTLE *quality* product at low cost. Order from SUTTLE or your distributor.

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of the United States Independent Telephone Association, and at the 1959 USITA convention, he was elected third vice president.

He was a member of the USITA REA Borrowers' Committee and the Toll Compensation and Settlements Committee.

Mr. Gates had been a long-time director of the Minnesota Telephone Association and served as its president for two terms.

He was a native of Kenyon, Minn., and moved to Minneapolis in 1932.

Survivors include his wife, Frances; a daughter, Mrs. James E. Smith of Lake Forest, Ill.; three brothers, Dr. Russell, of Santa Barbara, Cal.; Joseph, of Billings, Mont., and Donald, of Kenyon; and sisters, Mrs. Robert Shade of Richland, Wis., and Mrs. John Hedges of Faribault, Minn.

Microwave System Planned Along Alaskan Highway

A 600-channel microwave system running along the Alaskan highway is to be built by Canadian National Telegraphs, the prime contractor for the U. S. Army Signal Corps. The system will cost approximately 25 million dollars.

Although it is primarily for military use, the system will bring live television from the continental United States up to Alaskans.

Basically, however, the system is designed to strengthen communications between Alaska and NORAD headquarters at Colorado Springs, Colo.

The new line will tie in with the White Alice system.

Specifications were prepared by Canadian National Telegraphs, The U. S. Army Signal Corps, and the Alaskan Communications System.

Dingman is Vice President, Chief Engineer of AT&T

James E. Dingman has been elected vice president of American Telephone & Telegraph Co., and appointed chief engineer of the company, effective Dec. 1.

AT&T's chief engineer, Harold R. Huntley, is retiring at the end of 1959 after more than 42 years of Bell System service.

Mr. Dingman has been director of operations of AT&T's long lines department for the last three years. He will be succeeded in that post by C. Earl Schooley, vice president in charge of operations of the Indiana Bell Telephone Co.

The new AT&T vice president is a native of Baltimore and a 1921 engineering graduate of the University of Maryland. He began his Bell System career in Baltimore as an equipment installer for the Western Electric Co.

Two years later, in 1923, he joined the AT&T's long lines department as an equipment attendant. By 1937, he was division plant superintendent.

He has served as vice president of the Bell Telephone Co. of Pennsylvania and as vice president and general manager of Bell Telephone Laboratories. He became director of operations for Long Lines in November 1956.

Mr. Schooley has been vice president of Indiana Bell since February 1958. Previously, he was director of customer products planning for AT&T, and chief engineer of Southern Bell Telephone & Telegraph Co. His birthplace is Archie, Mo. and he is a 1928 electrical engineering graduate of the University of Missouri. His early Bell System career was in the Southwest with Long Lines.

Ohio Press Club Cites GT&E Board Chairman Power

Donald C. Power, chairman of the board of General Telephone & Electronics Corp., is one of 11 Ohioans who have been honored by the Ohio Press Club, Columbus.

Some 1,600 industrial, professional and governmental leaders of Ohio, including Ohio Governor Michael V. DiSalle and his cabinet, attended the award ceremonies on Nov. 14 in Columbus.

The awards cite those individuals who have gained national and international prominence for outstanding contributions to their respective fields.

"She dearly loves the telephone," is what her mother, Mrs. G. E. Cheatham, says about one-year-old Cathy Lynn, shown deep in conversation. Mrs. Cheatham is a telephone operator with the United Telephone Co. of the Carolinas and has been employed by the company for five years. The Cheatham's make their home in Pinehurst, N. C.

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More than 13 years ago Bartlett successfully pioneered the use of the helicopter for shade tree spraying—an operation that was to lead the way, a few years later, to a new efficient method of control of woody plants along utility rights-of-way.

At first, difficult terrains presented unusual problems but gradually through research and experience, new equipment was developed and new herbicides and techniques perfected to overcome them. Today, Bartlett research in this important field is carried on continuously through college fellowships and at the Bartlett Research Laboratories.

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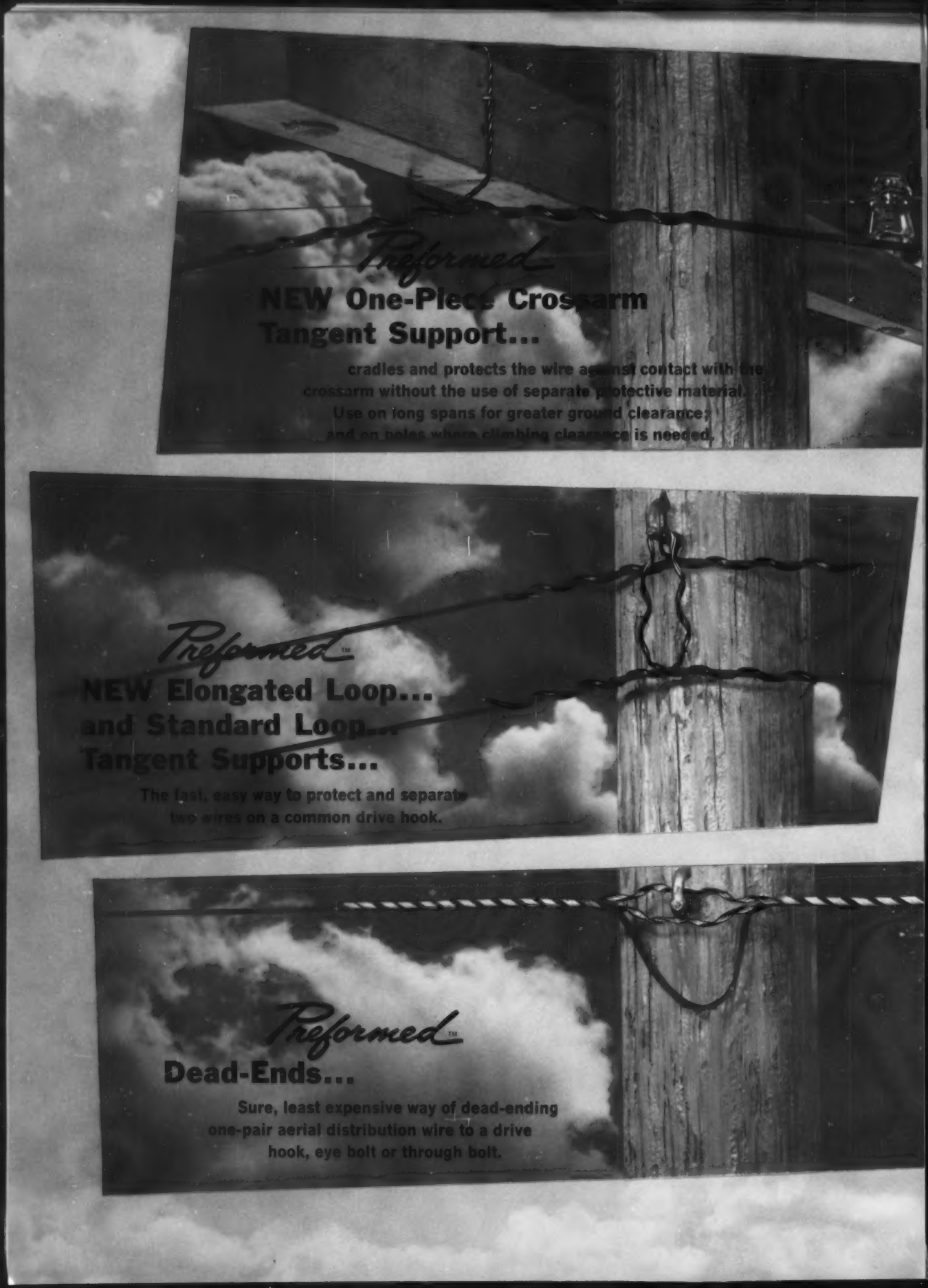
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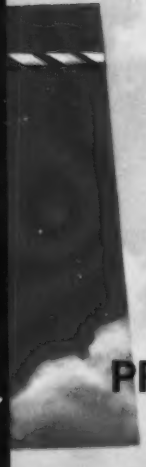

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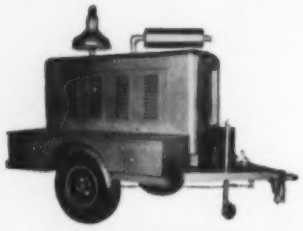

Units provide both single phase power for lights and 3-phase power for other needs. Many exchanges in an area can be served by a single unit.

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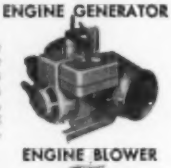

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DEFENSE COMMUNICATIONS FOR THE FUTURE

Continued from page 21

pound Atlas was dramatic demonstration of the use of voice channels from a space satellite—the forerunner of tomorrow's network, operating even farther out in space. The Defense Department hopes to launch the first of such satellites perhaps by late 1960, followed by others to create the space network.

Such a network could be achieved by establishing three unmanned satellites 22,300 miles in space. They would be launched in an equatorial orbit, and spaced 120 degrees apart. At the prescribed altitude, the satellites would appear to be in fixed positions relative to the earth because their angular speed would be made equal to that of the earth. Signals from each satellite would blanket almost half the earth, each overlapping the other.

This system might be capable of handling 30,000 one-way voice circuits, or 15,000 two-way voice circuits, plus three television networks. It also would be capable of transmitting facsimile, high-speed code, or teletype messages.

Hemispheres Would Overlap

Since each hemisphere would overlap another, stations in these overlap regions would act as inter-hemisphere relay points.

Ground stations in the overlap areas would be able to "see" two satellites at the same time. Communication with them would be direct, receiving messages from them and servicing other ground stations in two adjacent hemispheres.

These overlap areas would coincide with areas of high communication activities on earth. By establishing the ground stations in the overlap areas, the need for inter-satellite communication is reduced, since there will be immediate access to two-thirds of the earth via any two satellites from ground positions in the overlap areas.

As part of this world-wide system, a central switching control center would be established. Stations in each hemisphere continually would feed information into this center, electronically describing the status of their circuits. The data could be analyzed swiftly by a digital computer. Then, the center would send commands to the sending station to use specific circuits for its message. At the same time, the receiving station would be told what circuits it must use for the incoming call. Thus evaluation, commands to the stations, and completion of the call would be accomplished within seconds from any part of the world.

Then, there is an entirely new basic area which is commanding possibly more consideration than any other one aspect of defense communications. It is that of hardening of communications. From the beginning, the Air Defense Command, as well as the communications industry, recognized the importance of maintaining communications even in the event that a portion of a network should become disabled.

Alternate Routes

This problem was previously solved by providing back-up or dual capability for all important tactical circuits. Thus, should one route become damaged it is a simple matter to switch automatically to the other with a minimum of delay.

However, an electronic understudy, no matter how reliable, is not enough when we consider the destructive power of the ICBM warheads we may expect in case of attack. Additional precautions must be taken if we are to maintain a completely operative communications system under conditions of war.

Reliability of a communications system may be defined as the probability of being able to comply adequately, with the required system performance under specific operating conditions. The goal of the communications system should be such as to be entirely reliable under conditions of massive enemy attack with atomic or nuclear weapons.

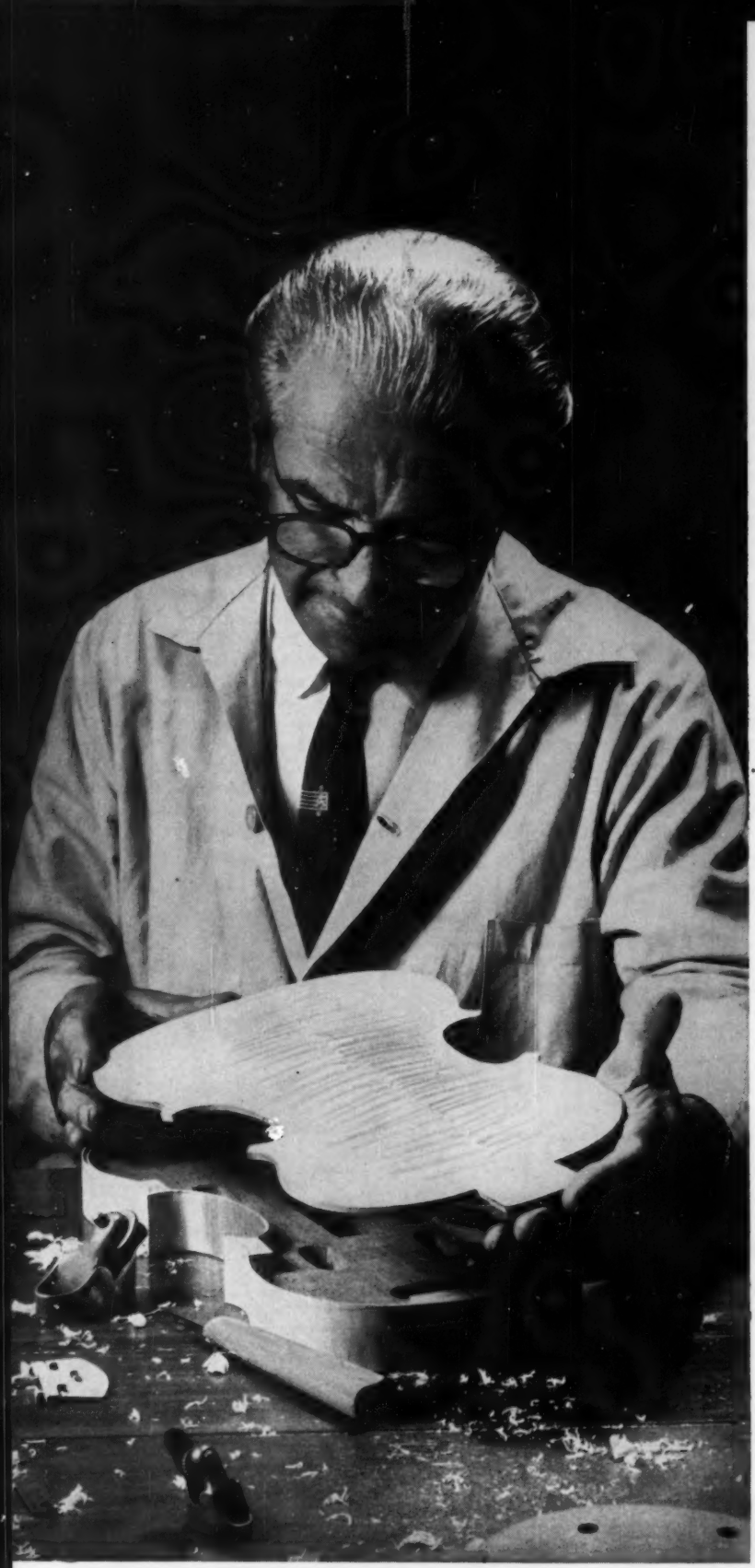
This reliability in communications can be achieved by making the system physically hard so that it can withstand the over-pressures to be expected from nuclear explosions.

Alternately, a similar degree of effective hardness can be achieved by providing redundancy in the communications channels so that at least one of the redundant channels will be capable of conducting essential tactical communications during or after the enemy attack.

Methods to Provide Hardness

In providing physical hardness, cable buried to a depth of 30 inches—which is a standard practice in the telephone industry—provides a high degree of physical hardness.

Another method, by which a high degree of reliability of wire communications can be achieved, is to provide redundant routes. When hardness is achieved, by this method, certain precautions must be observed. It is necessary to by-pass with our cable routes any critical target areas and maximum separation must be observed between



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The same thing applies to treated wood products. At AMCRECO no detail is insignificant. Each step—from selection of growing timber to treatment of the wood—is carefully controlled for highest quality.

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primary and redundant cable routes when entering communications terminal points.

VHF radio can be hardened with very little effort. Only the antennas need be exposed. If there is no requirement for directivity, it is a simple matter to make this element quite hard. The equipment itself will usually be collocated with the hardened installation it serves and can probably be accommodated in whatever hard building is to be constructed. The communications medium then becomes equally as hard as the facility it serves.

VHF radio does present distinct disadvantages. Its applications are limited and the radio wave itself deteriorates when associated with the elements given off by a high altitude nuclear blast.

The hardening of microwave equipment presents a similar problem, although normally little loss of signal is realized when line of sight conditions prevail because of a reaction of the signal with an atomic blast. The terminal equipment can be collocated with the military installation. A somewhat more complex directional antenna is required, but it can be made reasonably hard without too much trouble especially if advantages can be taken of local topography.

Special construction may be required if microwave repeaters are located at points which do not coincide with hard military sites. Provision must then be made to provide a hardened housing for the equipment, in addition to hardening the antenna.

Many Factors to Consider

Each communications medium presents its advantages and disadvantages as to the type most adaptable to a hardened configuration. The cost, of course, is one of the major considerations in the design of any system, whether hardened or soft. The cost of a communications system is influenced by such factors as topography, soil composition, terrain, distances over which we are to communicate, quantity of circuit paths required and the type and complexity of the signal to be transmitted.

It is *not* possible to generalize and state that one type of system is *more* or *less* adaptable to a hardened condition at the cheaper price than another system until all of the factors mentioned have been considered.

Buried communications cable would provide all of the features desired at the lowest possible cost in one instance, while in another an installation of this type would be so costly as to be prohibitive.

Again, all aspects mentioned previously must be considered in determining the best type of a hardened communications system to be used in any given application.

The need for hardening of communications systems cannot be over-emphasized. Because of time limitations and security restrictions, it has been possible to discuss only briefly some of the considerations involved.

To appreciate the role of communications in the future of the Air Defense Command we have only to take a quick look at our existing weapons systems. The two are so closely allied that they become in effect a packaged operation. Our weapons and counter-weapons can be only as effective as the communications system with which they are associated. It is significant that as we look and plan ahead we can do so with confidence. What will and must follow requires the sound foundation already developed and existent. We have so much with which to start and on which to build.

Even as we bend every effort to make sure that our defense communications continue to be second to none, we earnestly hope that the day never comes when it will be needed. Instead, by its very presence let it become a powerful deterrent to attack, an instrument of peace, if you will.

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IN THE NATION'S CAPITAL

Continued from page 19

lem, but the federal government and Lower Saxony have now agreed to issue stock, 60 per cent of which will be sold to the public. The remaining 40 per cent will be retained in equal amount by the two governments. Volkswagen has never had a strike, not only because labor and management had the final say as to wages and working conditions, but also because 80 per cent of the employes were refugees from East Germany and were content with their lot. Since Volkswagen had no stockholders it was not required to pay any dividends. The car could be priced at a point that satisfied the requirements of labor and material costs. No profit in the usual sense of the word had to be earned.

These conditions, unique in the world manufacture of automobiles, will now disappear. Stockholders will now want profits in the form of dividends. Labor, heretofore content, may become more aggressive and perhaps even management will not be as free-wheeling under the eye of a board of directors.

Actually, it would seem that the two governments will still have the controlling voice in plant policy. That is because they will retain 40 per cent of the stock. It would be unusual if more than that percentage of the other stockholders could be combined for action in common which would conflict with government wishes.

Nevertheless, this means that Volkswagen will now be competing in the market under conditions much more normal. It could mean changes in pricing or quality of the product; or perhaps the new owners will not care to interfere with what has been, and is, a very nicely going concern.

P. A. Betty, R. L. Ohlson To New GT&E Positions

Paul A. Betty has been appointed assistant to the executive vice president—finance, Jacob B. Taylor, at General Telephone & Electronics Corp.

Richard L. Ohlson has succeeded Mr. Betty as assistant to vice president —revenue requirements, W. R. Jarmon.

A graduate of the University of Illinois with a major in economics, Mr. Betty formerly was employed in the headquarters office of the Theodore Gary & Co., Chicago. He transferred to GT&E's New York headquarters office in 1956.

Mr. Ohlson, a graduate of Polytechnic College of Engineering in Oakland, Cal., has been employed by the General Telephone System in various operating and staff capacities since 1950.

S&G

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AUTOMATIC IN OPERATION

New Model "RC" cabinet mounted

The Model "RC" Dehydrator is designed to supply dry air to aerial and underground telephone cables. It is especially suited for small installations of 80 miles or less of cable. Wall or relay rack-mounted, the Model "RC" is approximately 24" high, 28" wide and 8" deep. Operating voltage is 115 volts, 1 phase, 60 cycle, and the output is 700 standard cubic feet per day maximum, with a dewpoint of —65°F. Other outstanding features are:

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Exchange equipment designed to supply chemically dry air for telephone cables, aerial and underground, this unit can supply as many as 30 cables. The unit is equipped with volume recording air meter, high and low pressure alarm switches, humidstat and hour meter.

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Helpful Literature

PLASTIC SPACER UNITS—Complete information is available on Preformed plastic spacer units (PSU), a new product which Preformed Line Products Co. states it has developed to eliminate midspan hits on open line wire.

The literature is published in three sections to be incorporated into the Preformed Telephone Catalog of Line Accessories, or, to be filed separately.

The first section, No. 82-200, is a four-page "fact" folder, giving performance and specification data.

No. 82-300 is an application procedure sheet describing the two methods of installation of the PSU: (1) Direct application and (2) slip type.

The third section is a folder of prices effective June 15, 1959. Request HL-538.

•

PLASTIC SPACER UNIT HANDBOOK—Preformed also has available a new pocket-size booklet, for use in the field, containing application procedures for the plastic spacer units. It illustrates two methods of installing the new plastic spacer units at the desired midspan locations:

(1) Direct application from a tower truck, ladder, or by dropping or pulling wires down to ground level.

(2) Slip-type application for use on spans that cross streams, gorges, etc.

The booklet contains charts to help linemen properly identify the plastic spacer units by line wire sizes, spacing, and color coding, Preformed says.

The contents of the application procedure booklet can be removed, if desired, to fit the Practices Handbook. Request HL539.

•

PRE-WIRED SERVICE EQUIPMENT BROCHURE—Suttle Equipment Corp. has announced a new brochure for telephone companies listing station apparatus, receptacles, outlets, junction boxes and other station installation hardware and equipment.

The brochure indicates the improved salability of new homes and buildings where the architect's or builder's plans call for prewired telephone service, as well as electrical service.

The architect or builder, the brochure says, should plan outlets in every room of a new house, and at multiple locations in office structures, all of which will accept one of several types of telephone service. This makes for many more extension sales and for sales of other service by operating telephone companies.

In addition, the brochure points out

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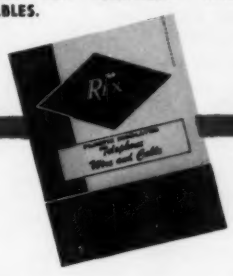

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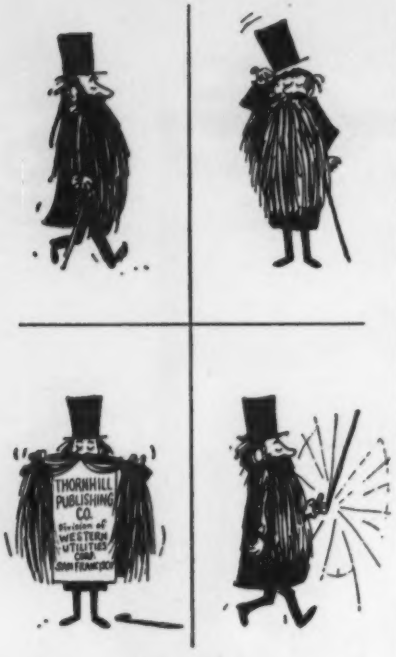

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BEAVERTON, OREGON

how the operating telephone company may avoid the cost of prewiring new homes for telephone service by making this work a part of the cost of the structure itself. The electrical sub-contractor can, at the telephone company's option, have the telephone company perform the initial prewiring work as a sub-contractor, billing the contractor for the cost of the labor and material used in following the architect's prewiring plans.

In some cases, the brochure goes on to point out, the electrical sub-contractor is permitted to install the protector cabinet, conduit, fishtape, junction-boxes and outlet hardware at the direction of the telephone company. This cost is then a part of the cost of the new home. The operating company, upon receiving an order for services, installs the protector, wire, and jacks, and then plugs in, or wires in, the instruments and runs a drop.

Suttle's new circular blue-beige face plates and standard new junction boxes are listed in this brochure and its accompanying price lists. A new outdoor or patio jack is also described.

Operating company management, it is claimed, will be most interested in the cost-reducing potentials outlined in the brochure as well as in the increased opportunities for extension sales presented.

Companies may wish to obtain a quantity of these brochures for distribution to architects and builders in their area. Copies are available at cost. For copy of brochure: Request HL540.

•

SUPPLY CATALOG—Issued recently, by Suttle, too, is a new completely priced supply catalog, now available to operating telephone company people. In addition to the listing of many new products now available to the telephone industry, special attention has been given to REA-approved product listings in many categories of materials and supplies. Request HL541.

•

COPYING MACHINE COMPARATOR—A slide rule comparator, listing details on office copying machines made by 10 different manufacturers, is available free from Minnesota Mining & Mfg. Co.

Designed to aid the prospective purchaser in his selection of the proper copying equipment, the comparator contains information on machine and paper costs, types of copying processes, number of copies possible per minute and number of processing steps, as well as details on nine other categories. Request HL542.

•

TRANSISTORIZED TWO-WAY RADIO — Now available from General Electric Communication Products Department is a bulletin on their new transistorized progress line two-way radio equipment.

The publication is reported to describe how small size (8½ inches wide, 12 inches long, and 4 inches high) makes possible a wide variety of positions in which the equipment may be mounted in cars and trucks.

Charts are included which are said to show how the car's battery can be saved due to the low power required by the new TPL unit, which uses 0.04 amperes on "standby" (with the engine off, ready to receive a call at full volume). This is less drain, the manufacturer points out, than the power required by a typical automobile clock, which runs continuously. Request HL543.

•

SOLDERING IRONS—Also from General Electric is an eight-page publication describing and illustrating GE's line of soldering irons.

Features of the irons, including lightweight, calorized, ironclad tips, and tubular heater are explained.

Case histories of savings obtained by companies using the soldering irons are also included. Request HL544.

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Patent Research Service Digests Data for Personnel

The Industrial Patent Research Co., Columbus, O., is now offering a unique service especially tailored for management and research and development staffs of electronics, and other fields.

The service entails the reduction of technical patents to easily understood digests of basic principles. These short summaries of patents, free from legal terminology and redundant detail, can be scanned and understood in a few minutes by scientific personnel. Thus, personnel are kept apprised of new developments revealed in patents, obtaining maximum useful information in minimum time.

Clients of this service can assimilate 50 to 100 or more patents a week in less time than is required to review a single lengthy patent, when provided with these concise patent analyses, the company says. The analyses are time-saving research tools which can realize significant cost savings, they state.

Patents to be analyzed are provided by the client to IPR which then prepares the analyses in accordance with an agreement established between the two companies. These concise extract-abstracts are then distributed to designated personnel of the client company. The latter are kept informed promptly, and permanently, of significant developments, past and present, in their fields of interest.

A more complete description of the services offered by IPR, examples of patent analyses in typical fields of interest, and further information are available from Philip E. Corbett, Director, Industrial Patent Research Co., 2266 E. Main St., Columbus 9, O.

Hill Assigned by Stromberg To Travel Ark. and La.

Marvin K. Hill, Stromberg-Carlson Telecommunication sales representative, has been appointed to travel the states of Arkansas and Louisiana, and several counties of southern Missouri, according to an announcement by T. C. Thompson, general telecommunication sales manager. Stromberg-Carlson is a division of General Dynamics Corp.

The southern Missouri territory formerly was served by E. R. Sears Jr., and Arkansas-Louisiana by J. E. Fairly, who has been assigned to the Iowa territory of the telecommunication sales organization.

Mr. Hill joined Stromberg-Carlson in 1955, and was foreman for the installation of XY dial exchanges in a number of Midwest communities. After completing a year as a service analyst in the customer service department, he

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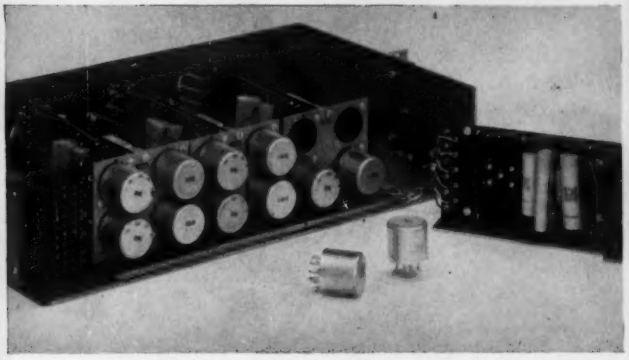

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For complete list of Kellogg offices, see pages 6-7.

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was appointed to the telecommunication sales staff.

Born in Bagley, Minn., he attended schools in Minneapolis, and studied business administration at the University of Minnesota.

After working as an installer for the Western Electric Co., Mr. Hill entered the U. S. Navy in 1942, and spent two years in China and two in Puerto Rico as a member of mine disposal and deep sea diving units.

M. K. HILL

For seven years he conducted an insurance business in Fergus Falls, Minn. During this time he also served a four-year term as justice of the peace in Fosston, Minn.

Mr. Hill has taken up residence in North Little Rock, Arkansas.

Highway Names Sales Head Of Utility Division

D. V. Wedeman, has been appointed general sales manager of the Utility Division of Highway Trailer Co. He was formerly general sales manager of the Maytag East Coast Co., Jacksonville, Fla.

Before joining the Jacksonville company two years ago, Mr. Wedeman was for six years divisional sales manager of the Maytag Rocky Mountain Co., Colorado Springs, Colo.

He has been a salesman and sales executive since his graduation from Texas Christian University, where he made his mark in football, with time out to become a pilot and a major in the U. S. Marine Corps.

Mr. Wedeman's appointment is in line with Highway's new program to expand and accelerate the growth of the Utility Division, according to David B. Charnay, chairman of the board of Highway, who made the announcement.

D. V. WEDEMAN

Additional distributors will be selected to cover open territories, Mr. Charnay said, and regional sales managers and sales engineers added to the sales organization.

These appointments will be concurrent, Mr. Charnay added, with a new long-range marketing plan. Also included is a stepped-up new product development activity coincident with promotion of the division's new hydraulic HCD digger, which, Mr. Charnay said, will be available after January, 1960. A distributors' meeting is also scheduled for early next year.

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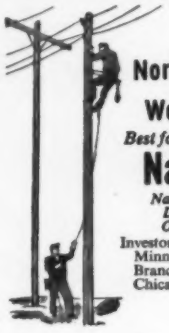
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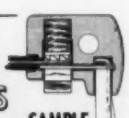

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Federal #25-C Dial PABX Switchboard, consisting of 25 Lines, 3 Links and 5 Trunks. Complete with Key Turret less Battery Charger. (As removed from service.)

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LEICH 901-wall or desk magneto telephones. Cleaned, tested and guaranteed, $16.50 each. As removed from service, no broken or missing parts, $15.00 each. Turtle Lake Tel. Co., Turtle Lake, Wis.

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ONE KELLOGG 1040 Crossbar dial switchboard; 500 lines, equipped with all relay line controller strips; suitable as addition to existing office of similar type. In excellent condition. Will sell all or part. Available now. Harold O. Davis, Western California Telephone Company, Los Gatos, California.

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NEW—COOK XB, TERMINALS, 16 pair, unprotected, with 5-ft. stubs. @ $5.00 each. Stromberg #1443—desk sets, like new, W/dials, St. line. Coiled cords, @ $12.00 each. Drop wire—C—span clamps, new, $5.00 per C. Calculagraphs, #33—used $35.00 each. Prices are F.O.B. Chicago, Ill. Independent Telephone Repair Co., 2137 W. 21st St., Chicago 8, Ill.

TWO (2) COMPLETE CENTRAL OFFICES (Dial), 650 lines, serving 3,052 stations. Too small for our expansion. Will sell all or part. Available November 1960. Can be purchased for less than $75.00 per line. Address inquiries to Purchasing Agent, Winter Park Telephone Co., 132 East New England Ave., Winter Park, Fla.

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1 rectifilter 1027 R., 1.0 amp.		35.00
4 sub cycles model S 20 cycle		25.00
2 #121 S.C. cordless switchboard with 5 trunks and 16 lines	each	200.00
8 phantom coils	each	2.00
20 kick coils	each	1.00
400 assorted condensers	each	.10

Mt. Vernon Telephone Co., Verona, Wis.

FOR SALE

TWO SUBSCRIBER CARRIERS COMPLETE—North Electric and Panhandle. Like new. Half price. Write Tygart Valley Telephone Co., Mill Creek, West Virginia.

1,000 LINES KELLOGG RELAYMATIC DIAL EQUIPMENT, 12 per cent trunking, selective ringing. Excellent condition. Available immediately, priced to sell. Write Box No. 4327, c/o TELEPHONY.

LEICH 86 magneto telephones; STROMBERG 1248 magneto telephones; KELLOGG 1070 magneto telephones. Just out of service—$7.00 each. If interested contact Warren Ritter, purchasing agent, Northern Ohio Telephone Co., Bellevue, Ohio.

250 LINES NORTH ELECTRIC MCX. Decimonic ringing, chargers, batteries, 9 E&M trunks, M.D.F. Complete office $8,000. Call or write W. C. DeLoach, Georgia Telephone Corp., Blakely, Ga.

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WILL SACRIFICE—MODEL 3730 Printing Addressograph, equipped with back printer and double front printer. Very good condition, only two years old. Machine located in Midwest. For information write to Box No. 4321, c/o TELEPHONY.

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One Kellogg Relaymatic switchboard, equipped 200 line, complete with charger, main frame, powerboard and decimonic ringing machine.

Two Stromberg-Carlson switchboard, 100 line magneto, 1 position equipped with 2 dial trunks. Used only five years—in excellent condition.

Make offer on any of above switchboards.

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(install your cycle ringer)

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Price with dial.....$12.50
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Price with dial.....$10.50
Price dial blank.....$ 8.50

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"These two Paystations average 148^{14} per Month"

REPORTS H. H. RANDALL, GENERAL COMMERCIAL MANAGER, GENERAL TELEPHONE COMPANY OF MICHIGAN, MUSKEGON, MICHIGAN

Busy intersections and paystations go together like ham 'n eggs. In downtown Muskegon, Michigan, increased pedestrian and auto traffic had created several busy intersections. The telephone company did some surveying and decided that these intersections had high revenue potential. Paystations were set up—and they proved profitable. For example: the two paystations above average $148.14 per month.

Let us help you make paystations pay off in your town. Write for a *free* copy of our pocket-size Survey Simplifier. It helps you find paying locations for paystations. Write Automatic Electric Sales Corporation, Northlake, Illinois. Or call Fillmore 5-7111. In Canada, Automatic Electric Sales (Canada) Ltd., Toronto 16.

H. H. Randall

PAYSTATION REVENUE FROM BOOTHS AT BUSY INTERSECTION, MUSKEGON, MICHIGAN

The two paystations at the above intersection totaled $1,777.75 for 12 months. One paystation brought in $919.55; the other, $858.20. Collections cover both local and toll revenue.

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